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Better Fruit

By C. W. Lyons, President Lyons Fertilizer Company

The subject of "Better Fruit" has been discussed many times in the past, and therefore I think that first we should ask ourselves the question as to whether or not we growers have been keeping pace with the times, and have been really producing better fruit.

To my knowledge, the most important marketing agenices have been setting forth in their advertising copy that we have been improving the quality and appearance of our fruit. Let us see what are the statistics of last season's crop improvement. These statistics are approximate, as I have been unable to secure positive facts in sufficient time for this article:-

Of a 15 million box crop of the 1925-26 season, 30 percent were Brights, 40 percent Goldens, and 30 percent were Russets. In analyzing the above figures we must all agree that this is by far too few Bright fruit, and too many Golden and Russets, and with constant effort on the part of the growers we can certainly improve these conditions.

The growers in Florida are fully convinced as to the juice content and the wonderful flavor of our citrus fruits. We have spent a great many thousands of dollars advertising this fact. Here is where we appear inconsistent. Because the consumer buys with the eye; so that just as soon as we offer the consumer good, bright fruit, plus all the other qualities that we have been giving, just so much sooner will we receive better prices for our fruit. We must arrive at a condition whereby when a certain brand of a grade of fruit reaches its destination it must be the standard that the buyer purchased from the salesman, or as compared with the samples submitted at the auction market, with positively no excuses offered as to the grade and as as to brightness and as to texture. The size of the fruit of course is always taken care of by the packing house. However, the pack is important, and each case must be uniform.

Stop and consider for one moment of the thousands of commodities that you purchase each year that have an advertised trade mark, and when purchased at various times one is like the other. The quality is always the same. So much so that when one becomes satisfied with this particular brand he never thinks of buying the so called "Just as Good" brand. The same thing is possible with our fruit that we ship.

But the only question is "How much longer are we going to sit by and see the extra profits that we are entitled to wasted?" This we know, that we have in Florida the finest lands and the most favorable conditions for the production of citrus fruits, and in addition the best varieties offered to the trade, and certainly reliable firms that manufacture and sell the necessary commodities that are needed to grow fruit that is quality in texture and quality in appearance. If we accomplish the above, I am sure the marketing agencies in the State are also ready to help to improve their pack.

To accomplish the part the grower plays in reaping quality fruit, would suggest the following program, which I feel sure most every grower is already familiar with. If not, we have county agencies, also the manufacturer of spraying materials and fertilizer have field men that are always ready and anxious to assist the grower in any way possible.

(1) See that the grove has the proper cultivation.

(2) Do not cultivate trees too late in the summer.

(3) Buy the highest grade fertilizer that you can obtain, as cheap materials will tend to coarsen your fruit and give it poor texture.

(4) Likewise the spraying materials: Purchase the kind that will give you the best results, and above all be sure and spray at the proper time, especially for rust mite and melanose, as rust mite and melanose certainly mar the appearance of the fruit more than any other one thing.

It is well for the grower to also keep in mind that the buyer always buys with the eye, irrespective of the quality contained therein.

In conclusion, I wish to state that the citrus industry is still one of the greatest assets of the State of Florida; and in my opinion, the State gets more favorable publicity from our citrus fruits than from any other one single class of advertising. Because you can hardly mention the name of Florida but what one thinks of either oranges or grapefruit, and I sincerely believe that the prospects of the citrus industry in this State are the brightest that they have ever been.

Fertilizing for Growth and Fruit Production

By R. W. Ruprecht, Chemist, Florida Agricultural Experiment Station, at Farmers' and Fruit Growers' Week

I hope none of you came with the expectation of hearing just what fertilizer formulas you should use for your citrus trees, for if you did you are doomed to disappointment. It is impossible to give you any formulas that can be used throughout the State, for different soils require different formulas.

I will try to give you some general principles and then refer you to your County Agent for more definite information, After he has gone over your grove and has seen the condition of your trees and the type of soil you have, he will be better able to advise you as to the best formula to use than I can without seeing your grove.

In all of our fertilizer practice we must bear in mind the action of the various fertilizer ingredients. We must remember that ammonia or nitrogen is the material that stimulates the leaf and branch growth; that phosphoric acid stimulates root growth and helps in fruit and stem formation, while potash is essential for the formation of sugars and similar products which in turn are necessary before you can have fruit. Potash also helps to keep your tree in a healthy condition.

Bearing this in mind let us see how we should fertilize our trees. In the spring we want our trees to start off quickly and get the new growth hardened up before the aphids can get busy. We also want to push out the bloom and set a good crop of fruit. Therefore, we fertilize heaviest with ammonia, and want most of the ammonia from rapidly available sources such as nitrate of soda and sulphate of ammonia. In general, a formula carrying 4 and 5 percent ammonia with ¾ of this ammonia from inorganic sources is found to give good results. The phosphoric acid will run from 6 to 8 percent, while the potash will be the lowest in this fertilization of any during the year.

The summer application of fertilizer is, to my mind, the most important of any during the year. This fertilization plays the biggest part in the quality of fruit, and determines in a large measure the amount of bloom you will get next spring. In order to get a good set of fruit buds it is necessary to have a plentiful supply of stored up carbohydrates. As potash stimulates the formation of these compounds we must have a sufficient supply of this element in our fertilizer.

In order to get good sized, juicy fruit, especially if you have early fruit, a plentiful supply of ammonia is necessary. However, if you have too much ammonia present you will not get a heavy set of fruit or flower buds but leaf buds instead, and you may get coarse fruit.

We must also bear in mind that during the summer months we have our rainy season and that ammonia compounds are easily washed from the soil. In buying our fertilizer for this application, it is advisable to specify that one half of the ammonia be derived from organic sources such as blood, tankage or fish scrap. For most groves about 3 percent ammonia in the formula is plenty at this time.

The amount of potash to be used at this time will depend on the variety of citrus you have. If you have early oranges and grapefruit go light with your potash. If you have mid-season, or late oranges, I would make this the heaviest potash application, unless you wanted to keep some fruit for March and April shipments. In which case I would postpone the heaviest potash application until the fall or winter application.

Now why do I make these recommendations—For this reason I believe that a plentiful supply of potash will prolong the ripening period of citrus fruits. As yet we haven't any definite results upon which to base this opinion. However, we have indications. In our experimental grove at Lake Alfred, where we are comparing high vs low potash fertilization, we find that the low potash applications make for a higher sugar content in the fruit than the high potash. As the maturity of citrus fruit is judged by its content of sugar, it seems that the low potash causes a somewhat earlier maturity. Due to the fact that we have no laboratory facilities at the Lake Alfred Station, we have been unable to study these differences as thoroughly as we would like to. Also we have no early oranges in this experiment, only Valencias.

On another grove of pineapple oranges, near Agricola, in an experiment conducted in cooperation with Dr. H. J. Wheeler, we found that where no potash was applied the fruit matured earlier than where 8 percent potash has been used. However, the lack of potash produced a very small fruit. This experiment had to be discontinued before we could get enough data to justify publishing the results.

Please do not go away with the idea that we have proved that you can control your ripening by the application of potash. What I have given you are indications and not final results. While I am talking about the effect of fertilizers on maturity I want to state that we have not found that sulphate of ammonia had any influence in reducing the acidity of either oranges or grapefruit as some growers seem to believe.

For the last application of fertilizer in the year, a low ammonia fertilizer is to be recommended and one derived largely from inorganic sources. The object being to have the trees make the last flush of growth and have this hardened up before cold weather comes. We use the inorganic sources of ammonia largely because we do not want to have a large store of available ammonia when we have a warm spell in January, which might cause the trees to start growth.

The potash should be high enough to have plenty for your fruit and still have enough left to keep your trees in good condition. If your crop consists largely of Valencias or Marsh Seedless grapefruit that you are holding for late shipment, your heaviest potash application should go on at this time.

If you are after quality fruit, and I presume most of you are, you will have to do more than just put on fertilizer. You will have to watch your humus content of your soils. Until recently entirely too little thought has been given to the effect of humus in the soil on the quality of fruit produced. Other things being equal, I believe that the higher the humus

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Fumigation of Citrus Trees

By J. R. Watson, at Farmers' and Fruit Growers' Week

For many years the standard way of treating trees for scale insects in California has been by fumigating them with hydrocyanic acid gas under tents. The first method used was the so-called "pot method" in which the gas is generated under the tent by dropping into dilute sulphuric acid cyanide balls. At first potassium cyanide was chiefly used and then sodium cyanide. Later on the cyanafumer came into use. This was a machine in which the gas was generated outside of the tent and then conducted into the tent thru a tube. Now the common method of fumigation is by the use of liquid hydrocyanic acid gas.

All these methods were, at various times, tried in Florida, but no progress was ever made. In the first place there was only a short period during the winter when the fumigation could be carried on and it had to be done at night and on comparatively dry nights. Probably the chief reason, however, for its failure in Florida was that at that time the most important pest of citrus trees in this state was whitefly. The cost of fumigating as compared with spraying is so high that it is justifiable only in the case of a pest which cannot be readily killed by spraying or, because of its greater thoroness, one fumigation taking the place of two or more sprayings. But in the case of the whitefly the trees were, of course, reinfested at the next flight of the whiteflies. So that in order to keep the trees reasonably clean by fumigation it would be necessary to fumigate at least twice a year.

Scale insects, of course, do not fly and therefore spread from one grove to another much more slowly and if once thoroly killed out by fumigation, will remain in check for a year or so. For this reason fumigation has been much more of a paying proposition against scale insects than against whiteflies. During the past few years Florida whiteflies have become quite secondary in importance as compared with scale insects.

Furthermore, a new method has been developed of generating the gas which eliminates some of the objections to the older method. In this method the gas is generated by dusting the trees, or the ground underneath the trees with calcium cyanide, a dark colored dust which liberates the gas as soon as it comes in contact with moist air or soil. Fumigating by means of calcium cyanide can apparently be carried on at any time of the year when it is feasible to spray trees. There are two companies experimenting in the state at the present time, using somewhat different mixtures of calcium cyanide. One is still confining its operations to night fumigation, the other has done most of its fumigation in daylight. I have been checking up the kill obtained by the American Cyanamid Co. On the purple scale the kill has averaged over 95 percent. Nearly all of the scale that escaped the fumigation have been those that were under something, such as in a colony of the woolly whitefly. Even a spider web seems to give them some protection from the gas, but most of them were underneath purple scales. When scales are massed on deep it is difficult to reach the live ones at the bottom. Still this percentage of kill is much higher than is ordinarily obtained in commercial spraying. The kill on the Florida red scale has been even more satisfactory, averaging over 96 percent. The higher kill in this case is due to the fact that the Florida red scale does not have the habit the purple scale has of crawling under other scales, most of them are fully exposed on the leaves and fruit where the gas can get at them readily. The Florida red scale has been a difficult one to control by oil emulsions due to the fact that the scale covering is thick and heavy and fits very closely to the surface of the leaves. It would seem that fumigation offers a very satisfactory method of dealing with a heavy infestation of Florida red scale.

The possibility of controlling both scale insects and rust mites has been kept in mind and careful watch on the fumigated groves has indicated that one may reasonably expect fumigated trees to be reasonably free of rust mite for from two to three months after fumigation. In some counts made this summer two months after fumigation the rust mites were just beginning to get back on the fumigated trees. They were only 1-10 as abundant as on unfumigated trees. In this grove only six rows of trees had been fumigated, leaving abundant opportunities for reinfestation. If the whole grove had been fumigated doubtless the reinfestation of rust mites would have been greatly delayed.

Fumigation of course costs more than a single spraying and is justified only by its greater thoroness, so that one fumigation may replace two or more sprayings. Under just what circumstanes fumigation may be profitably used in Florida in comparison with spraying remains to be seen.

Fumigation is a highly technical operation and will have to be carried on by trained men. It is not a proceeding for the individual growers to undertake. It will have to be done by groups of well-trained men on a contract basis. Furthermore the costs of the tents would make the operation prohibitive for an individual grower, as the tents would be idle much of the time and too much money would be tied up in them. Also the dosage must be accurately measured and not guessed at and the placing and removal of the tents requires trained men.

DR. ALLISON TAKES UP SOILS RESEARCH AT GLADES STATION

Appointment of Dr. R. V. Allison as soils specialist of the Everglades branch of the Florida Experiment Station is announced by the State Board of Control. He commenced work September 1 and will be stationed at the Everglades Station at Belle Glade in Palm Beach County.

Dr. Allison is a graduate of Purdue University, Lafayette, Ind., and received his M. Sc. and Ph. D. degrees from Rutgers College and State University of New Jersey. He also has had 14 months of study and travel in Europe, and eight months of research work at the laboratories of the Rothamstead Experiment Station in England.

Besides considerable experience as laboratory assistant in bacteriology and plant pathology, Dr. Allison also has done teaching work in agronomy and soils. For the past two years he has been chemist and soil biologist for the Tropical Plant Research Foundation in Cuba, where he has encountered a number of problems similar to the work which will be his in the Everglades.

The soils problems are among the most serious confronting the investigators at the Everglades Experiment Station, and Dr. Allison's work should be of considerable assistance in the research work there.

Citrus Fruits, Grafting

Budding, Grafting and Top-Working

By J. H. Jefferies, Citrus Experiment Station

The nursery is the starting point of a citrus grove. It is therefore one of the factors of greatest importance. If improper selections have been made in the matter of stocks and buds disappointment is certain as you will not get a uniform or productive grove. In selecting seeds from which to grow nursery stock vigorous parent trees of known productiveness should be selected. Great care should be exercised in the selecting and grading of the seeds, also with the selecting of the seedlings at the time of setting out the nursery. After the trees are two or three years old it is a good policy to go through the nursery before budding and grub out all inferior trees.

Selection of Budwood

The selection of budwood should be made with the fruit attached, so as to assure the selection of bearing wood and the quality of the fruit. These can be spread out on a table for reselection for uniformity of the fruit. One should avoid angled wood and wood of a watershoot nature as it does not produce a good fruit bearing tree. Well rounded wood of not more than a season's growth is best. Thorny budwood should never be used, as thorny trees are very undesirable, and careful selection of thornless budwood will soon result in thornless trees. It has been found that the portion of wood adjacent to the fruit is an ideal piece of budwood, being perfectly round and thornless and it will make a low headed tree. To preserve the budwood until needed the wood should be cut in the desirable lengths, tied in bundles, labeled and packed in sawdust in a small box, then buried a few inches deep in a cool dry place.

Season for Budding

October and November are good months for dormant budding, or about April after a vigorous growth has started for spring budding. However, buds can be inserted any time of the year if the bark of the stock will seperate from the wood.

Budding

Budding of citrus is best done by the shield or T budding method. This is done by making a perpendicular cut about an inch long and at the lower end a cut about a half inch long, before removing the knife give it an upward turn, this will raise the bark sufficiently so the bud can be inserted without further manipulation. The bud is cut by holding the stick firmly between the thumb and finger so it will rest on the lower part of the thumb, lay the knife almost in a parallel position drawing the blade in a downward stroke toward you so as to make a straight smooth cut. Insert it under the bark by gently pushing it upward in the incision. Then wrap with wav cloth commencing at the bottom, no tieing is necessary.

To make wax cloth procure thin unbleached muslin and tear in strips about six inches wide, roll until two inches in diameter and tie with a twine then place in an iron pot and cook slowly in the following mixture: Resin six pounds, beeswax two pounds, linseed oil one pint. After it has been penetrated with the wax it can be cooled and torn into strips one-half inch wide and twelve inches long.

In ten or twelve days the buds will have united with the stock and a light gray tissue will appear on each side of the bud, it may then be unwrapped. Care should be taken not to let the bark grow over the bud which will sometimes occur if wrapping is kept on too long.

Forcing the Buds into Growth

In order to force the buds to push uniformly after they have healed on, it is necessary to severely check the growth of the stock. For very small trees the top is cut off about an inch and a half above the bud. But large trees should be lopped by cutting three-quarters of the way through the tree, by placing the pruning knife about one and a half inches above the bud and lopping the trees of two rows into the same center so as to leave the alternate centers for cultivation. Another way of forcing buds into growth is by girdling the tree. Make a circular cut all the way around the tree just above the bud, then a corresponding cut three-fourths of an inch above the first; take out the piece of bark between the two circular cuts and prune back the top of the tree. The bud will start to grow quicker with this system and there is very little loss of energy to the tree. After the bud has made sufficient growth the top may be cut off and the bud staked so as to protect it from the winds. The development of the buds should be carefully watched and pruned in such a way as to produce a top of the desired shape.

Cleft Grafting

Grafting is not commonly used for citrus trees but at the time of a freeze and the trees should be killed to the ground it can be resorted to for trees two or three inches in caliper. The trees are cut off at right angles close to the ground, then place a strong knife in the position the graft is to be inserted; drive the knife in about one-half inch then use a small cold chisel to open the incision made by the knife. The graft should be about four or five inches long and trimmed to a wedge shape to fit the incision made by the knife. The outer edge of the scion should be a little wider than the inner. After the scion is placed in position the pressure will be sufficient to hold the scion in place. Cover it with melted paraffin and bank up with soil enough to just cover the scion.

Crown Grafting

It is preferable to cleft grafting as it can be used on larger stock and is easier done. The tree should be cut off squarely at the ground. The scions are about four inches long and should be cut with a slanting cut, and these are inserted between the bark and the cambium layer. They should be tied with twine then covered with melted paraffin and banked enough to cover the scion. This type of graft should be well supported by stakes as it is easily blown out by winds.

Top Working

It is sometimes necessary to top work young trees about the age of four or five years. In such cases, give a thorough pruning of the branches to open up the trees; then insert about three buds in each branch about one foot above the trunk and buds not too far apart. If you insert the buds in the fall do not do anything to them until early spring as they will remain dormant during the winter. After the danger of killing cold girdle just above the bud with two circular cuts three-

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Says Florida Citrus Stands High In Trade

Returning from a tour of the large northern markets, F. L. Skelly, manager of the American Fruit Growers, Inc., of Orlando, stated that he is very highly gratified with the high standing the Florida citrus fruit has with the trade throughout the country.

"In my opinion Florida oranges and grapefruit are becoming more favorably known with the trade and with the consuming public each season," said Mr. Skelly. "The continued improvements in grading and packing and the excellent quality of of our fruit have made many friends for Florida fruit throughout this and foreign countries."

"The present dependability of the leading Florida packers has in my opinion, won friends among the trade which are of equal value to the army of consumers who have made the acquaintance of Florida grapefruit and oranges through the advertising of the principal shippers. Thus, Florida citrus fruits are now able to obtain the fullest appreciation of the consuming public to which their uniform juciness and superior quality entitle them.

"General business conditions affect the reception in the markets of the coming season's citrus crops in Florida, California and the islands. Throughout the larger manufacturing centers business conditions are excellent. There is no unemployment situation in sight and wages are excellent in almost all manufacturing industries and employees are prosperous. Agricultural products on the whole are selling now at generally satisfactory prices. While it is true that there was an over-supply of peaches from both Georgia and North Carolina and a larger supply than could be consumed at satisfactory prices, peaches from Virginia, Pennsylvania and other sections are now bringing very satisfactory prices.

Apple Crop Large

"The apple crop this year is the largest ever grown. Apples at the present time are selling at reasonable prices; however, there is a long time between now and the harvesting of the entire crop and the placing of it in storage. The trade in general looks for reasonable prices to prevail throughout the season. Last season they sold at very reasonable prices, there was a large crop of apples and while Florida citrus fruits sold at exceedingly good prices throughout the season.

"Deciduous fruit of every variety are in heavy supply and will be for the next two months.

"California estimates the remaining Valencia crop, to be shipped after September 1, to be 6000 cars. Most of this fruit will be moved in September and October with possibly four or five hundred cars to move in November. This is more than three times the amount they had remaining on September 1, 1925. The California Valencias are very ripe and a considerable amount of the fruit is badly creased but of excellent eating quality. It may be possible that they may have to force a larger amount on the market in September than they now anticipate on account of the fruit being full ripe.

"Porto Rico and the Isle of Pines are shipping their new crop of grapefruit at the present time and it is bringing excellent prices. The early grapefruit in Porto Rico is much less than last season but the late grapefruit crop that will come in the spring and early summer is considerably in excess of last season.

Florida Outlook Good

"The advice coming into this office on the Florida crop at the present time is that the fruit is of exceedingly fine quality and good sizes and if we have favorable weather conditions from now until October 1 there is no doubt but that the quality and size of the fruit will be excellent. We look for exceedingly good prices to prevail on early shipment and good prices should prevail up to November 15 on both grapefruit and oranges. After that time there is no doubt but that reasonable prices will prevail during the remainder of November and up to January 1. If the crop is moved out regularly throughout the season we anticipate another most successful year for the Florida growers."

When asked about the attitude of Northern people toward Florida Mr. Skelly said that the bankers and business men throughout the North are very favorably impressed with this state and consider it very substantial in every respect and on a generally sound financial basis.

"The criticism that one hears comes from uninfluential people, and, in my opinion, does not affect the state in any way whatsoever. From all indications and from my observations, Florida will experience one of the largest tourist seasons ever in its history," said Mr. Skelly.

EXCHANGE MARKETING FRUIT

Excellent progress is being made on the installation of the marking machines in Florida Citrus Exchange packing houses to be used this coming season. These machines will stamp the trade name 'Seald-Sweet" on the skins of all oranges and grapefruit of that quality shipped by Exchange growers during the coming season.

Contracts for more than 200 machines were placed last season. At the present time more than 100 of these machines are installed, tested and ready for operation.

Consumer preference for branded merchandise is well known. The public places greater confidence in a product whose producer stands back of it by branding it. Greater public confidence means greater demand, higher prices, constant trade recognition and steady, repeat business.

STOP FIRES IN THE PINE BELT

Modern forestry, forest industries and agriculture combined will support many times our present population in prosperity in the turpentine pine belt. This has been demonstrated for over half a century.

The same area in farms alone will not support one-half as many people so well.

The opportunity for prosperity and growth in every community in the turpentine belt of the South is greater than they know. To enjoy it, the fire plague must be stopped.—Pine Inst. of America.

Higher prices for beef cattle are in prospect within the next 18 months for both the feeders and range producers, according to a recent report on the outlook for beef cattle, made by the United States Department of Agriculture. An upward trend is probable over the next two or three years, the department says.

Citrus Aphids

Factors Influencing Citrus Aphis Outbreak

By J. R. Watson, at Farmers' and Fruit Growers' Week

Altho the title of the article is general we have in mind only the New Citrus Aphid, **Aphis spiraecola.**

A word as to the history of this insect as an orange pest in Florida. During the spring of 1913 many complaints were received of an unusually severe damage to citrus, but it was supposed we had only to do with the old Melon Aphid and, aside from giving the growers ways of combatting it, no particular notice was taken of the outbreak. The outbreak subsided again in the summer of that year, but again appeared in considerable force during the fall. In 1924 the aphid outbreak was much more severe and investigation showed that we had to do with a species new to us as a citrus pest. The insect was finally identified by Dr. Baker of the Bureau of Entomology as **Aphis spiraecola,** the Spirae Aphid. This aphis has long been known as an inhabitant of shrubs of the genus **Spirae,** of which the common species in Florida is the well-known Bridal Wreathe. The insect is very closely related to the Green Apple Aphis of the North and works in the same way. There is a possibility that they may be the same species. It may or it may not be significant that previous to the outbreak of this aphid on citrus in Florida there was extensive planting of **Spirea** on post-office grounds thruout the state. But the origin of this insect as a citrus pest is a mystery. Apparently the aphid changed its food habits and took to citrus. If so it apparently did so independently in Florida and California, as Mr. Yothers found it in one citrus section of California a year ago. The earliest record of its presence on citrus in Florida is in the fall of 1922 when certain growers in the Tampa and Bradenton sections are quite sure it invaded their groves. Examinations of the foliage in these groves in 1923 seemed to bear out their contention that the pest was there in the fall of 1922.

It has recently been reported as seriously damaging citrus trees in Louisiana and the writer has received specimens from the satsuma belt of Alabama. There are no signs of its presence on the satsumas in most of the satsuma belt of Florida. A survey last fall disclosed not a single aphid on satsumas. Altho in some sections, as at Quincy, it was infesting **Spirea** within 50 feet of a satsuma plantation. Yet satsumas from Gainesville south are severely infested as any other variety of citrus.

During the spring of 1924 the damage was great in the southwestern part of the citrus belt. From there it spread over the entire peninsula during the summer. In the spring of 1925 the damage was great over the entire peninsula. During the past season the damage has been comparatively light, only about 1-10 that of the previous season. A comparison of the two winters, that of 1924-5 and 1925-6 is very instructive and should teach us a lesson as to the most economical method of combatting the aphid. First it must be understood that the aphid attacks only young and tender foliage. As soon as the foliage begins to harden the aphids get restless, winged individuals begin to appear and the winged adults fly away and the wingless ones wander about in search of more succulent vegetation. They cannot live on mature foliage. The character of the damage is well known to most of you, namely the curled leaves, stunted growth of the twigs. If you will examine your grove today you will find very little fruit on twigs whose leaves are badly curled. Furthermore, you will find very little fruit on twigs whose leaves were badly curled last year. In other words the damage to the new growth not only reduces the crop during that year but apparently prohibits the development of healthy blossom buds during the summer with the result that on badly damaged twigs there will be little or no fruit during the following year. If the twig is attacked when it first appears as a small bud on the parent twig, its growth may be stopped at once by the aphids, and if the infestation continues the trees may be prevented from pushing out new growth at all in the spring. This type of injury has resulted in the actual death of many young trees.

Turning, then, to the comparison of the winters of 1924-25 and 1925-26. The first was a comparatively mild winter with some new growth out on young trees practically all winter and aphids could be found in practically all young groves any time during the winter, altho usually in small numbers. Last winter, on the contrary, was characterized by a rather steady cold, altho the temperatures were not excessively low, except in a few localities. Nevertheless the temperature was sufficiently low to prevent the formation of any foliage over most of the citrus belt. The result was that the aphids starved to death. Those that did go thru were so few in numbers that they were not able to get sufficiently abundant to greatly damage the first flush of growth in the spring. However, there were a few striking and very instructive exceptions to this rule. For in some of the extreme northern parts of the citrus belt the foliage was cut back by a late frost with the result that the main flush of spring growth was much delayed and when it did come out was heavily infested with the aphids, simply because it was later than that of most of the state. This is undoubtedly the chief reason why tangerines have been more severely injured than other varieties of citrus—they are later in putting out their spring flush of growth.

Altho the damage done this past year has been small as compared with the two previous seasons it is not advisable to get too optimistic. If next winter should happen to be mild enough to allow considerable growth on young citrus trees during the winter the probabilities are that we will again have a heavy infestation of aphids in the spring, unless the growers take active measures to combat them. We cannot, of course, with any degree of certainty, predict the future weather. We do know, however, that cold and warm winters come in cycles. We have a series of warm winters and then a series of cold winters. Some authorities are convinced that there is an intimate relation between a series of cold winters and periods of unusual (Maximum) activity in sun spots. At least we know this much: records show that all our freezes have come during periods of sun spot maximum, altho not every such period has brought a freeze. Last winter was a period of unusual sun spot activity. The cycles of sun spot activity will vary from eight to thirteen years, averaging a-

bout eleven. The culmination of the last one occurred in July 1917 and doubtless most of our growers remember what happened during the winter of 1917-18. Adding eleven years to this would bring our next maximum sun spot period in July of 1928, but the great sun spot activity of last winter and the fact that it is now rapidly declining leads some authorities to believe that we have already passed the maximum. If this is true and there is anything in the sun spot theory we may reasonably expect a series of somewhat warmer winters. In that event we will probably have more trouble from aphids unless the growers combat them.

Experiences during the past two years should teach us a valuable lesson in cheap and economical aphid control. Namely, that the time to fight the aphid is during the periods of comparative dormancy of the citrus trees. The citrus tree naturally grows in flushes, alternating with periods of relative dormancy. This habit is very hard on the aphids as they are starved out during the dormant periods. In the main there are about three flushes of growth and three dormant periods during the year. The most important period, from the standpoint of aphid control is that of the winter. If we could get all of our trees, both young and old, to go dormant at any particular season it would be very hard on the aphids. Except for the few that could live over on other plants, they would be exterminated, for, altho this insect lays eggs which can endure zero weather and cooler in the northern states, it has never been observed to lay any on citrus. Furthermore, the egg-laying females which are a deep yellow color are so different from the light green color of the viviperous females that they can be readily recognized. These bright yellow, egg-laying individuals have never been seen on citrus. Furthermore, eggs which have been laid on other plants have as far as observed invariably shrunken up without hatching. It has been observed in the North that if a period of warm weather follows the deposition of the eggs of the Apple Aphis that the aphids inside the eggs invariably die. This is probably what happens to our Citrus Aphis here in Florida. The winters are too warm to enable the eggs to go thru. Leastwise of this much we may be sure: that eggs are not of any practical importance in carrying the aphis over the winter. They winter over mostly as viviperous females on citrus. We should then do our best to accentuate the material tendency of a citrus tree to grow in flushes alternating with dormant periods. And we should make a special effort to exterminate the aphids in our groves during the winter, because it is in the early spring when the first flush of growth comes out that the aphids have always done most of their damage.

The most important factor in bringing a citrus tree into dormancy during the winter is undoubtedly cold. This, of course, is beyond the grower's control. The next most important factor is probably soil moisture. Altho the rainfall is, like the temperature, beyond the grower's control, there are certain grove practices, which tend to preserve soil moisture. One of these is cultivation. Under aphid conditions it is very important to stop cultivating the groves in the late fall. Let us do nothing that will stimulate growth during the winter. Another practice which is generally considered as stimulating continual growth on trees is that of applying heavy applications of quickly available nitrogen in the late fall and early winter. Spraying or fumigation, particularly if the material that you use is strong enough to cause partial defoliation on the trees, are also liable to stimulate growth. Old bearing trees are usually dormant and it is seldom indeed that aphids will winter over on them unless it is an occasional water sprout. These, of course, should be removed. Experience of the past winter has shown very definitely that if we can reduce the aphids to very small numbers during the winter we can get the first growth by in the spring with comparatively little damage and this method of fighting aphids will be vastly cheaper than to attempt to kill them by insecticides after the infestation has become general in the spring. But if next winter is warm you may expect that, in spite of our best efforts, there will be some growth on young trees practically all season, but it will be a relatively easy matter to keep these occasional outbursts of growth free of aphids. A grower should begin certainly as early as December to inspect his grove regularly and destroy all aphis found. If there is only an occasional sprig of young growth on his trees probably the best plan would be to cut it off, but if there is very much young growth at any time this would be an undesirable proceeding, as severe pruning is apt to stimulate new growth and that is the very thing the grower wishes to avoid. During the winter most new growth will appear well out on the ends of the branches of young trees and probably the most thoro way to deal with the aphid colonies on these sprouts is to dip them in an insecticide. These slender branches can very readily be bent over into a bucket containing an insecticide. Probably the best insecticide for this purpose would be nicotine-sulphate and solutions or solutions of derrisol. The solutions can be made pretty strong, say a tablespoonful of nicotine-sulphate and an equal quantity of soap to each gallon of water. Derrisol can be used at about the same concentration as the nicotine-sulphate. This dipping is very thoro. If the twigs are switched around a little in the insecticide all aphids will be killed, even those in badly curled leaves. This process should be continued up to the time when growth starts in the spring.

When it becomes evident that the trees are going to put out the spring flush of growth and the date is sufficiently late to make danger from frost injury less than that of danger from aphids, the grower should do everything consistent with the health of his trees, to stimulate growth. Fertilize them well. Part of the fertilizer should be quickly available nitrogen. Start the cultivator going. Preserve soil moisture. If the weather is dry and the groves are equipped for irrigation he should irrigate his trees, the object of this being to get the spring flush of growth well out and hardened up before the aphids can get sufficiently abundant to inflict severe damage upon the tender growth.

I imagine some of you will say "It will be of no use for me to do this, my neighbor just over the fence will do nothing." This as an excuse for a do-nothing policy among the citrus growers has been worn threadbare. It is particularly inappliable to aphid control for the reason that when the new flush of growth is coming out in the spring there are very little migration from your neighbor's grove to yours. As mentioned above, it is when the growth begins to harden that winged aphids are produced in large numbers. Consequently it makes comparatively little difference during the first growth of spring whether your neighbor cooperates or not as far as your grove is concerned. If you hasten your growth in the spring and get an early flush there will be practically no migration from his grove to yours, but if his grove begins to put out growth just as the growth on

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GROVE CALENDAR FOR SEPTEMBER

Timely Suggestions for Grove Work During the Present Month

Give last fertilization and cultivation to young non-bearing groves and nursery stock.

Spray citrus trees with an oil emulsion for white-fly and purple scale.

Cut cover crop of cow peas or beggar weed by 15th to avoid an infestation of pumpkin bugs later.

Spray pecans with 4-4-50 bordeaux to control scab. Add one pound of lead arsenate to 50 gallons of bordeaux to control case bearer.

THE NEW CROP ESTIMATE

The preliminary estimate of the Florida citrus crop for the season of 1926-27 has just been issued by the United States department of agriculture, placing the yield for the present crop at 17,000,000 boxes. This is divided, according to the estimate, as 9,600,000 boxes of oranges, and 7,400,000 boxes of grapefruit, and compares with 14,700,000 boxes of citrus actually shipped out of the state by rail and water last season. Including shipments by truck to other states and the consumption within the state, for table use and canning purposes, the crop of 1925-26 is placed by best posted Florida authorities at 16,600,000, so the government estimate for the 1926-27 crop really exceeds the actual production of the previous year by only 400,000.

This is the most conservative preliminary estimate made by the government in a number of years, and is in line with the best judgment of local authorities who have been inclined to place this year's yield but little higher than that of a year ago. Probably last year's fumbling of the early estimates has resulted in greater care in making preliminary investigations this year.

BETTER FRUIT NUMBER

Every year The Citrus Industry devotes its September issue to special articles dealing with the production and proper marketing of better citrus fruit. Each year we endeavor to secure articles from the best known citrus growers and experts in the citrus field dealing with the best methods for attaining this desired end. These articles this year, we believe, are of especial interest and if given proper study and carefully followed by growers will result in much benefit in the efforts to improve the quality and appearance of Florida fruits.

In the matter of juice content and sweetness, Florida citrus fruit is not excelled by any fruit grown in the world, but it must be confessed that there is much to be desired in the matter of appearance of much of the fruit produced in this state. It is with a view to improving this outward appearance and placing it on a par with the internal excellence of the fruit that these better fruit numbers are issued each year and the leading authorities in the various lines of citrus endeavor are called upon to give the results of their experience and investigations in the production of fruit of superior quality and appearance.

When Florida citrus fruit is placed on the market equaling in external appearance the fruit grown in other sections, the marketing problems of Florida citrus growers will have been solved, for the internal qualities of the Florida fruit will then place it ahead of all competition. The paramount problem of the Florida citrus grower today is the improvement of external appearance.

FARMERS WEEK A SUCCESS

From Gainesville comes word that the Fifth Annual Farmers' and Fruit Growers' Week, which closed on Saturday, August 14, was marked by record breaking attendance and an unusually instructive and beneficial program of papers and lectures. Registration on Monday, August 9, was the largest first day registration ever recorded for Farmers' Week, and the total attendance for the week was about 1,000. Every section of the state was well represented.

General sessions of all visitors were held daily at 11 o'clock, at which time outstanding speakers delivered addresses. The list of speakers on this program included Dr. A. A. Murphree, president of the University of Florida, Dr. Wilmon Newell, dean of the College of Agriculture, L. Russell Warner, assistant quarantine inspector of the State Plant Board, Governor John W. Martin, Dr. D. W. Daniel, well known educator and humorist of Clemson College, S. C., and Dr. Hiram U. Byrd, president of the Florida Audubon Society.

The night programs were given over to entertainment and amusement. These programs included a band concert on Monday night, an organ recital on Tuesday night, a picnic on Wednesday afternoon and night, a humorous lecture on Thursday night, and a musical entertainment by Gainesville people on Friday night.

The instructional programs were divided into sections on farm crops and livestock, citrus and sub-tropical fruits, pecans, small fruits and ornamentals, truck crops, poultry, and home economics. The meetings in all sections were well attended, and were marked by unusual interest on the part of visitors. The poultry, grape and bulb meetings were especially well attended.

COVERS INDUSTRIAL FIELD

Industrial Florida, a monthly business publication with executive and business offices at 52 East Pine street, Orlando, is the latest addition to Florida class publications, the first number of which was issued on September first. Industrial Florida is owned and published by Frank Kay Anderson and J. R. Davidson, jr., with the former as editor and the latter as business manager. The publication itself is well edited, as might be expected under the editorship of Mr. Anderson, is filled with interesting and important industrial news of the state, is well printed and attractive in every way. Mr. Anderson has long contemplated the launching of such a publication and the first number of the new magazine seems to justify his belief that the field is here and the time is ripe for its appearance. Associated with Mr. Anderson in the editorial direction of Industrial Florida are such well known writers as B. R. Walzer, Frank L. Huffaker and Thad G. Hallinan, while A. G. Mann's name appears at the masthead as assistant business manager. The Citrus Industry welcomes Industrial Florida to the list of Florida publications, and under the direction of Mr. Anderson, one of the state's best known and brightest writers, it anticipates a prosperous career for the new publication.

BETTER TERMINALS SECURED

Changes sought by the Florida Fruitman's Club of the New York Terminal Company have been granted and immediate steps are being taken to put the plan in operation for the approaching citrus season. This action was taken at the insistence of the Fruitman's Club, which sent a delegation headed by President V. B. Newton, to New York City to urge the contention of the Club on the Terminal Company. This is considered one of the most important steps taken by the Fruitman's Club in its efforts to further the interests of Florida citrus growers.

The new plan gives Florida shippers pier 28, properly heated, with auction rows overhead. It also provides for a holding yard in New Jersey and numerous other changes which will aid the shippers of the state by reducing expenses and bettering market conditions. The change is considered one of the most beneficial and important in the history of the industry, and it was said it will place Florida on an equal plane with California.

WHO CONTROLS STATE BODY?

Mr. L. B. Skinner, president of the Growers and Shippers League of Florida, well asks: "Do the railroads dominate or control the Florida State Chamber of Commerce or just some of its officers?" The query is inspired by a bulletin issued by the State Chamber of Commerce favoring the railroads in the present controversy with citrus shippers over the re-adjustment of rates. Certainly the Growers and Shippers League is entitled to the support of the State Chamber of Commerce in its fight for more equitable rates for citrus fruits, and if that body is to give its support to the railroads, it is not entitled to the support of Florida citizens and commercial and industrial interests. Let's find out who controls the State Chamber of Commerce.

WILL ENFORCE INSPECTION LAW

With the establishment at Haines City of headquarters for citrus inspectors, active steps are being taken to strictly enforce the Florida green fruit law and the observance of the inspection tax law. All early fruit shipped out of the state must undergo rigid inspection and pay the inspection tax by the affixation of the inspection stamps. This law worked to the general satisfaction of growers and shippers last season, and doubtless prevented the shipment of much green fruit from the state. The same excellent results are expected to be achieved this year.

The fertilizer concerns of Florida are in better shape to handle the needs of the growers than ever before. New and enlarged plants, additional equipment and increased facilities all along the line will help to expedite the handling of increasing business.

Reports from the field indicate that grove plantings this winter will be much heavier than for the past two years; also that the plantings will begin earlier in the season than usual. Nurserymen report that many bookings are being made for early winter delivery.

Present indications are that the 1926-27 citrus crop will be far below normal. If this proves to be true, fruit properly picked, packed and marketed should net its grower a profitable return.

Fifteen or twenty per cent of brights is the estimate made by some experienced shippers of Florida citrus fruits. That percentage is entirely too low. No grower of citrus should be satisfied until his crop shows more than fifty per cent brights.

The Satsuma is one of the finest fruits in the citrus family, and it will be many years before the production outstrips the demand.

Satsumas - Cultivation

Developing a Satsuma Grove

By J. Lee Smith

Apparently all fruits come to nearest perfection when grown in the most northern clime to which it is adapted. This fact coupled with the one that certain soils of North and West Florida are particularly adapted to growing satsumas make it a very valuable fruit for this part of the state. It will grow on a large variety of soils but it is not believed that it will produce the best and most fruit on the lighter sandy soils that have not a good clay subsoil. The lack of soil moisture seems to be the determining factor when grown on such lands. The better grade flat woods seem to be very well suited, but it must be well drained because satsumas will not stand wet feet. High hammock and high pine lands are best suited. The lighter phases of the Orangeburg and the heavier phases of the Norfolk series seem to be the most ideal.

Site

After one learns the proper soil types for satsumas he must then proceed to find this soil type properly located so as to give his grove the greatest natural protection possible from low temperatures. This means from frosts in case of a still freeze or from the cold blasts that usually bring our low temperatures to us. Because the colder and heavier atmosphere settles in the low lands a grove on such site would likely be badly damaged in case of a still freeze. However, if such site should be near a large lake, a large stream, or some other large body of water it would be desirable because the water will temper the atmosphere.

At one time it was thought that a northern or western slope was the proper place for a Satsuma Grove because on such slope it was thought the trees would not bud so early in the spring, therefore less danger of late spring colds. There seems such little difference in the time of budding on the northern and southern slopes that I would not consider it a very good reason. On such slopes when a cold blast does come, which has been the case with practically all of our low temperatures in the last 45 years, the trees receive great punishment and the kill has proven to be greater. I therefore personally prefer a southern or southeastern slope. Without water protection the site certainly must be elevated.

Even though when elevated the site should not be completely surrounded with dense forest. If so surrounded the atmosphere will eddy in this opening. Therefore the lower woods should be opened up so that the atmosphere would pass on off. The woods or windbreak above should be thick enough to break the cold blast and yet not dense enough to cause the air to eddy below. Because the wind in winter is from the north or northwest this windbreak should be on the north or northwest and the way of escape on the south or southeast.

Water drainage is just as essential.

Trees to Plant

The Owari is the only variety recommended for commercial planting. The fruit of this variety is of a most excellent quality. It should be budded on Citrus Trifoliatta Stock. Satsumas budded on any other stock should not be considered at all. Grown on Trifoliatta Stock the fruit does not dry out like it does grown on other stock. The fruit colors fairly well as soon as ripe and remains in good condition for a reasonable period after picking. This stock goes dormant during the winter and thereby forces the satsuma dormant in which state it withstands low temperatures better.

Plant the largest size one year old buds that can be had if you want the best trees. This is usually a 5-8 inch caliper tree. By so doing one is sure to get the most vigorous buds. Smaller trees of the same age or older buds of the same size are likely to be weaker buds. Younger and smaller buds are not likely to live so well. Such trees have not been stunted, will live well, will grow off well and soon grow a lot of foliage.

Trees From Nursery to Field

HEELING IN: It is presumed that the trees have been properly handled after digging and properly packed for transplanting. When trees are received from the nursery, they should be unpacked, planted immediately or heeled in. By "heeling in" we all understand to mean dig a shallow sloping ditch and lay the roots down in this. Some dirt should be put over these and then wet down. More earth should be put on them and let stay till ready to plant.. If trees have been received in the afternoon and they are to be planted during the following morning they may be stood in a barrel or tub of water during the night. The roots had probably dried out some and this wetting will start them to functioning again.

Of course the soil should be well prepared and the land to be planted staked off the distance desired. Most growers are setting theirs 20x20 or 25x25 feet.

TRANSFERRING TREES FROM HEELING BED TO FIELD: Some planters pick up an armful of trees, go along dropping them one by one by the side of the holes leaving them there wholly unprotected from wind and sunshine until all are planted—possibly thirty minutes or an hour. Such practice is murderous to trees. Instead of this practice the planter should take a few trees at a time from the heeling bed, wrap the roots closely in a large wet sack and take one from that bundle at a time and keep all others well wrapped till that one is planted.

PRUNE ROOTS AND TOP: All roots 1-16 of an inch in diameter should be freshly clipped with a sharp knife or shears just before tree is set. BROKEN OR BRUISED roots should be cut away just above the break, because a fresh, smooth cut will heal much easier and quicker than one left rough. I have observed in many cases when a tree does not grow off well there is a broken root where an infection has started and the pith turned black.

DIGGING HOLES: Many growers make the mistake of digging large holes deep into the red clay and that, sometime before the trees are to be set. Holes should be no larger nor deeper than is absolutely necessary to accomodate the roots. No roots should be cramped. The lateral or feeder roots should be used to make a hole to accommodate the tap root leaving the soil unbroken under the lateral roots. This unbroken soil enables the soil moisture to flow faster to the roots and will start them to functioning quicker. If holes are dug some time in advance of the setting the soil in the walls of the hole dries out and the tree suffers.

PLANTING THE TREE: Every thing ready plant the tree. Set it upright in the hole and straighten out all roots, crowding or cramping none of them to get them in the hole. Put on loose top fertile soil, but no fertilizer. Pull tree up a bit and set it back to settle earth under roots. When roots are well covered pack it to them by tramping. Put

more soil on them and tramp that until hole is filled with good top soil. In case there is not a good season in ground the tree might be watered before tramping soil. Place loose soil on top of packed soil. Packed earth around the roots enables the soil moisture, which is so essential to the life of the plant, to flow to the roots faster and the loose earth on top prevents the soil moisture from evaporating.

WATERING: Though watering during the spring months has not been practiced by the planters of satsumas during the dry season of April and May, the writer is convinced that it is the economical thing to do. To do this the earth should be piled around the tree so that a basin is formed and in this basin a gallon of water should be put every week to ten days.

HEADING AND SHAPING THE TREE: When ready to set, the head of the tree formed in the nursery should be cut off leaving the tree a stub twelve or fourteen inches high. When growth starts buds burst out covering practically the entire body of the tree. When these buds are an inch or two long all but five or six can be rubbed off if the grower desires, leaving these buds distributed as well as possible over the entire height and circumference of the tree, from two inches of the bud union up to the top. This produces from the begining a well shaped and well balanced tree. The advantages gained by this process besides a well balanced and well shaped tree are: No limbs crowding on the body of the tree, and the grower is not bothered continuously with adventitious buds; more bearing wood in a given length of time than if headed high; and when banked all exposed body of the tree, and all the main crotches will be protected. When buds are not rubbed off practically the same results are to be had except the crowding of some limbs.

BANKING: By banking is meant the hilling up around the trees in winter to prevent the damage to the body of the tree in case of severe freeze. THE TREES SHOULD BE BANKED WITH CLEAN EARTH ABOVE THE CROTCHES OF THE LARGER LIMBS SOME TIME DURING THE FIRST TWO WEEKS IN DECEMBER AND ALLOWED TO REMAIN SO TILL THE COMING OF SPRING. Clean earth should be used in banking because if decaying vegetable matter is in the bank, termites (wood lice or white ants) are more likely to be present and attack the trees. If grass turf is used it will not lie snug up to the tree, cold air will creep in, and damage will be caused. Weather bureau records show that our danger period from cold is from the last of December till the middle of February, therefore banking should be done before the middle of December and should remain until the first of March. If after the bank should become settled, funneled, or washed down it should be rebuilt.

DISEASES AND INSECTS: If a tree is to develop swiftly it must be kept clean of diseases and insects. This can be done very largely with one dormant spray of oil emulsion. Trees devitalized with insects are worthless and potentially dead in case of a freeze.

Cultivation

From March to August 1, a period of five months is not sufficient cultivation for a satsuma grove yet that has been the quantity of cultivation given to it by many growers. No one can state just how much or how little cultivation a grove must have. But this we do know. GRASS AND WEEDS MUST NOT BE PERMITTED TO SOD OVER THE ROOT AREA DURING THE SUMMER MONTHS AND A DUST MUCLH SHOULD BE KEPT THERE DURING THE FALL DRY SEASON. The most satisfactory results can be had with the use of a spring tooth harrow, with an acme harrow, or with a cultivator run shallow up and down the tree row. Cultivation with a hoe does not give the desired results.

Cover Crops

The proper soil moisture has more to do with keeping the trees in the proper physical condition than any other factor. That is why a dust mulch is needed on the land during the dry fall months. That is one reason why soil with a clay subsoil is more adapted to growing satsumas. Decaying vegetable matter is necessary in the land to act as a sponge in holding moisture in the dry season; vegetation is needed on the land to remove the excess soil moisture during the rainy season and to prevent the packing of the soil. It is also needed to trap the plant food as it becomes available. This makes a summer cover crop an absolute necessity. Velvet beans, crotalaria, cow peas, or soy beans will make an excellent cover crop for the groves. These cover crops should be put in early enough in the season that the land will be well covered, except the tree row, during the summer rainy season. As soon as the rainy season is over which is usually during the first weeks in September this cover crop should be removed, either mowed down, disked into the land, or plowed in shallow. One should refrain from disking deep or plowing after the dry season is set in. Rye or oats or a combination of both can be sown in October or November for a winter cover crop. This can be plowed in in the spring.

Fertilizing

Satsuma trees have been and can be again overstimulated, with fertilizer. With the present available information on fertilizing satsumas, it is most impossible to state in pounds just what the proper amount of any grade of fertilizer should be applied to a tree to make it most healthy and hardy. However, fertilizer should not be applied in such quantity as would force the tree to throw out long, large, vigorous shoots, yet enough should be applied, and that often enough to make the tree make three good, normal, healthy growths each year.

THE HORTICULTURAL SOCIETY

By W. W. Yothers, Asst. Secretary

It is reasonably certain that the Proceedings of the Florida State Horticultural Society meeting held last May at Cocoa will be in the mails not later than September 15th. This is quite a bit sooner than for several years past. There has been, as usually the case, an enormous amount of work required to edit and arrange the papers, read proof and get the membership list as near correct as possible.

The forthcoming number contains much of value to citrus growers as well as people interested in beautifying home grounds, parks, highways, cemetaries, etc. The article by Nickerson on growing King Oranges and by Lord on pruning are of exceptional merit. People who want copies may procure same by sending me $2.00. All of this money is expended in printing the book and other expenses of the Society. No officer receives any money for his services; in fact most of us loose actual money. There will be a deficit this year again and it is to be hoped many orders for books will be received. There is an index being published. This was prepared by Miss Eleanor G. Shaw of the Experiment Station simply as a labor of love and the citrus industry owes her a great debt of gratitude.

We all hope the appearance of the report will stimulate interest in the Society and many members will be added to the list.

Citrus Fruits, Coloring

Coloring Citrus Fruit In Florida

By William R. Barber, Assistant Physiologist, and Lon A. Hawkins, Physiologist, Office of Horticultural Investigations, Bureau of Plant Industry

The advantages of coloring citrus fruit which has reached a stage of development at which it is edible and desirable for food but has not yet taken on the yellow or orange color usually associated with maturity in the minds of the consuming public are well recognized in some of the citrus-growing regions of the United States. The practice originated in California. It was first applied to the coloring of lemons and later adapted to oranges, particularly Valencias, which have a tendency to become green late in the season, even though they have once assumed the golden-yellow color. The method for lemons is described by Sievers and True, who show that the coloring of the fruit is due mainly to a gas formed by the incomplete combustion of kerosene, gasoline, or some similar petroleum product, and not, as was commonly supposed, to heat and humidity. The work of these writers put the coloring of lemons on a stable basis in California, and cheap and efficient methods have been developed for the coloring of this fruit. Nearly all packing houses are equipped with some facilities for coloring. At some seasons with certain kinds of fruit, it is a very common practice and considered one of the essential operations in preparing it for market. Recently Chace and Denny have shown that ethylene can be used for the coloring of lemons and oranges, and this simplified process is being used to a considerable extent in California.

Although very commonly employed in California, the method of making green-colored but physiologically mature citrus fruits more attractive and salable was not used to any extent in either Florida or Alabama prior to 1919, when experimental work on the coloring of Satsuma oranges was begun in the latter State. In a recent publication on the results of three years' work in Alabama, Wright emphasizes the fact that Satsuma oranges in that State frequently reach a stage of physiological maturity at which they are palatable and attractive as an article of diet long before they assume a golden-yellow color on the tree. He also brings out the facts that the Satsuma orange crop in Alabama is in danger of frost after November 15 and that the best market for these oranges is in the early part of the season, before they color on the trees. He showed that the method of coloring by the use of kerosene-stove gas was adapted with certain modifications for the coloring of these oranges and then determined the effect of this treatment on the marketability of the fruit. Facilities for coloring the fruit have been provided in most of the packing houses, and a considerable portion of the crop was colored in the seasons of 1921 and 1922.

In view of the conditions existing in the citrus industry in Florida and at the request of some of the most progressive and farsighted citrus growers of the State, experimental work was begun in 1920 to adapt to Florida conditions the process of coloring citrus fruit in use in California and Alabama.

The conditions in this State are somewhat similar to those in Alabama. There is considerable acreage of Parson Brown and other early oranges in Florida, which under normal conditions ripen in the early fall while the weather is warm and usually reach their best dessert quality before taking on a yellow color on the tree. This is also true of some varieties of grapefruit, such as Davis, grown in certain parts of the State. Dancy tangerines and Valencia oranges in Florida frequently develop a high dessert quality without assuming a yellow color, and much of this fruit would never have the rich golden yellow color on the tree, although in good condition for eating, as it has a tendency to dry out if left unpicked too long.

From a careful survey of the field, apparently there was no basis for the conclusions that the color of citrus fruit is an indication of its dessert quality or attractiveness as an article of diet and that the color of the skin of the fruit when it has reached this stage in its development is partly a varietal characteristic and partly dependent upon the climatic and cultural conditions under which the fruit is grown. It is obvious, then, that treating fruit which is physiologically mature or has reached a stage in its development at which it has high dessert quality, so that it assumes a color or appearance pleasing to the eye and has a higher decorative value, is a legitimate practice in marketing and one which should be encouraged. It is, of course, also true that the coloring of fruit which has not reached the stage of development at which it is desirable for food and that consequently might be considered as artificial coloring to conceal inferiority or immaturity is reprehensible and should not be permitted.

Experimental Work

The investigation proceeded along two lines, (1) testing the effect of the gas on the various types of fruit and working out methods for coloring these fruits experimentally, and (2) the application of these results to the coloring of fruit on a commercial scale. This, of course, entailed the testing of different methods of making the gas, the working out of methods of applying it, and the designing of suitable rooms and equipment. The effect of the coloring on the commercial value of the fruit was also taken into consideration.

The Gas For Coloring

The gas commonly in use for the coloring of citrus fruit is made by the incomplete combustion of kerosene, gasoline, or a similar petroleum product. When kerosene is burned without sufficient oxygen for complete combustion, several gases are given off, among which is the gas or gasses which will destroy the chlorophyll or green coloring matter in the skin of the orange without killing the cells or otherwise injuring the fruit. The yellow coloring matter present in the skin but masked by the green is evident when the chlorophyll green has been bleached out. The fruit attains an attractive yellow color. From the work of Denny it seems probable that the active principle of this gas may be ethylene. He has found that ethylene can be used for the coloring of citrus fruit and has developed a process for coloring on a commercial scale with this gas.

Coloring Grapefruit With The Exhaust From A Gasoline Engine

The first experiments carried on

in Florida in this investigation were in coloring grapefruit with the exhaust from a gasoline engine. This work was done at Homestead in a small experimental room built for this purpose. The room was large enough to contain 60 standard field crates of fruit, was made practically gas tight with building paper and sheathing, and was provided with a small ventilator in the ceiling which could be closed with a slide. The exhaust from a 2 1-2 horsepower gasoline engine was piped into the room and liberated in about the middle of the floor.

Three lots of about 60 boxes each were colored in this room in these first experiments. The first lot consisted of fruit ranging in color from 5 to 30 per cent. In coloring this fruit the engine was run intermittently for 7 to 12 hours during the daytime, and the door and ventilator were opened at night to allow the air to circulate through the fruit. A relative humidity of 75 per cent was maintained by hanging wet sacks around in the room, and 46 hours after the engine had been started the fruit ranged from 90 per cent to full color. The engine had been run 29 1-2 hours during this time.

In the second experiment the room was filled with grapefruit which showed about the same percentage of color as the first lot, and the same plan of intermittent gas treatment and ventilating was followed as before. At the end of 29 hours, the gas having been applied for 19 hours of this time, the fruit was approximately 50 per cent colored. The engine was then stopped and the fruit held in the closed gas room 38 hours longer. At the end of this time the fruit was from 90 to 100 per cent colored and in practically the same condition as that in the first run. The lot which received the most gas reached this same condition in 21 hours less time.

The third experiment was made with a mixed lot of sorted fruit, the entirely green being separated from the turning fruit or that showing 5 to 10 per cent color. The same procedure of intermittent gas treatment was followed in this as in the two earlier experiments. After 73 hours in the coloring room, with the engine running 31 hours of this time, the turning fruit was from 90 per cent to full color, and the fruit which was deep green when placed in the room was just beginning to take on a yellowish tinge. This last-mentioned lot of fruit was kept in the coloring room with intermittent gassing for 66 hours more, or about six days in all, at the end of which time it was about 90 per cent colored. This experiment demonstrated that it was possible to color even deep-green grapefruit but that it required a considerably longer time than that which was changing color naturally.

In the fourth experiment, a roomful of grapefruit showing 5 to 10 per cent color, as in the first two experiments, was used to test the effect of a very light concentration of the gas. The gas was applied for a period of 4 hours on both the first and second days and for 11 hours the third day. The engine was then stopped and the room kept closed. At the end of 50 hours the fruit was about 70 per cent colored, and in 39 hours more, or 89 hours in all, it was practically full colored. The buttons (short ends of stems with the calye lobes attached) were firm and green, in contrast to the results obtained in the first three experiments, in which they were loosened during the gas treatment and in many cases dropped out.

These four experiments demonstrated that it was possible to color early grapefruit with exhaust gasses from a gasoline engine and that a good color is obtained by intermittent applications of the gas. This of course tended to give a lower concentration of the gas, with the result that the buttons remained on the fruit. The results of these experiments were applied on a larger scale in another coloring room of nearly a car capacity. In this room 300 boxes of Davis grapefruit were colored in about 72 hours by the exhaust from a 5-horsepower engine, the gas being applied about 13 hours each day. The fruit was well colored at the end of three days, and most of the buttons remained attached to the fruit after brushing. The grapefruit was in good conditions when marketed. These experiments show that fruit can be colored by the exhaust from a gasoline engine and that in some cases at least this procedure would be commercially practicable. It of course involves the operation of an engine, which in most cases would run idle part of the time.

Coloring Grapefruit And Oranges With Gas From Kerosene Stoves

In Florida, in most cases a common type of kerosene cooking stove with an asbestos wick is used for making the gas for coloring citrus fruit. These stoves may be put directly in the coloring room or tent with the fruit, in a pit or basement beneath that containing the fruit, or in a specially constructed room outside and at some distance from the coloring room, in which case the gas is forced through a pipe to the room by means of a fan. This method is to be recommended, as there is less danger of fire; it also furnishes a little better condition for coloring.

Experiments were carried out in houses equipped with these outside gas houses and in others with stoves in the room. These experiments were concerned with the best method of producing gas from the stove, the proper humidity for coloring, the precautions necessary in order to retain the buttons on the fruit, the temperature required for rapid coloring, and the methods of obtaining these various conditions. Most of this work was done in commercial coloring rooms attached to packing houses, but some of it was carried on in a room built expressly for this experimental work.

Modifications of Burner Necessary

In coloring the fruit it is essential that the right gas be furnished in requisite concentrations without too much heat. If combustion of the kerosene is complete, the ultimate products are carbon dioxide and water, and much heat is produced. Moreover, neither the gas nor the heat colors the fruit quickly. Coloring is brought about by gas formed by partial combustion or a partial breaking down of the kerosene induced by burning it with an insufficient supply of oxygen. Inasmuch as burners for kerosene stoves are designed to give as complete a combustion as possible, it is necessary to modify them by cutting off the air supply to the flame so that they will produce the right kind of gas for the work. After repeated trials it was found that in the method in which a metal disk one-eighth of an inch less in diameter than the cylinder was placed in the inner tube of the burner and a plate of the same material put on top, resting on bent wires, so that there was about one-sixteenth of an inch clearance between the top of the burner and the plate, the burner when lighted would produce the gas desired. With this burner it was found that a good proportion of the gas effective in coloring the fruit was produced without the excessive heat which was yielded by complete combustion of the kerosene, though of course considerable heat is necessarily generated in this process. The method followed in modifying this burner can be adapted to other burners of different construction, for the principle involved is the same. The air supply should be cut down just as much as possible while still vaporizing the kerosene, so that the flame will be blue. If the draft is cut off too much the burner

will smoke, flare up, and give off quantities of soot, resulting in a dirty appearance of the fruit without producing the desired orange or yellow color. The gas formed in this way is frequently called "stove gas," and this term will be used in this bulletin.

Relation of Temperature to Rate of Coloring

The temperature at which the fruit is held has a very important bearing upon the rate at which the fruit colors and also upon the appearance, keeping quality, and general condition of the colored fruit. If the temperature is high the fruit is liable to become brown or scalded in spots, or it may be so severely injured that its life after it is removed from the coloring room is very short. It was observed early in the work in Florida that the presence of the stove in the room with the fruit had a tendency to produce dangerously high temperatures. Air temperatures as high as 120° F. were found in numerous instances in boxes of fruit near the stove. This temperature is, of course, too high and undoubtedly is harmful to the fruit if maintained for any considerable period.

Experiments were made to determine the rate at which the fruit would color at temperatures under 90° F., which is considered about as high a temperature as it is safe to use. Fruit was cooled down and colored in a precooling plant, the stove being placed directly in the room with the fruit and sufficient refrigeration furnished to take up the heat from the stove and cool down the fruit at the same time. Inasmuch as this experiment was carried on with carload lots, it was not possible in every case to get exactly comparable fruit. The results, however, are so marked as to eliminate any error from this variation. In these experiments the temperature of the fruit as it was placed in the room was taken by means of thermometers thrust into the fruit, and temperature determinations were made in this way at intervals during the process.

Experiment 1.—Parson Brown oranges at a temperature of 80° F. were placed in a precooling room, cooled down to a fruit temperature of 40° in 48 hours, and held at that temperature until they were about 50 per cent colored, gas being applied continuously. It required six days to color this fruit.

Experiment 2.—Parson Brown oranges at a temperature of 80° F. were subjected to gas from a kerosene stove for 24 hours at 80°, at the end of which time the fruit began to show a tinge of yellow color. Refrigeration was then turned on and the fruit cooled and treated with gas at the same time. At the end of four days it was well colored.

Experiment 3.—Pineapple oranges showing 20 per cent color and having a fruit temperature of 90° F. were placed in a coloring room having an air temperature of 56°. The fruit reached a temperature of 64° F. in 24 hours and was maintained at 62° to 64° for the next 38 hours, gas from a kerosene stove being applied for the entire 62 hours. At the end of this time the fruit was approximately 50 per cent colored.

Comparable lots of fruit were placed in three other coloring rooms. The first had a temperature ranging from 77° to 84° F., or about 80° on the average; the second 75°, to 79°, an average of 77°, and the third an average of 78°, about the same as the second. After the gas had been applied for 36 hours to first and second rooms, the fruit was moved out on the packing-house floor and allowed to stand 24 hours longer. At the end of that time it was about 90 per cent full color in the first or 80° room and between 80 and 90 per cent in the 77° room. The fruit in the 78° room was treated with gas for 30 hours; at the end of this time it was about 60 per cent full color.

These experiments are of interest in that they show the importance of the proper temperature for coloring the fruit if it is to be done rapidly. The experimental work, during the three years it was in progress, was supplemented with numerous observations in the coloring rooms, showing conclusively that it required from four to five days to obtain 100 per cent orange or yellow color on fruit giving no inclination of yellow when placed in the coloring room. Fruit would assume a yellow or orange color more quickly at 70° to 75° F. than at lower temperatures; at 80° to 85° oranges would show a distinct yellow color after about 36 hours continuous exposure to the gas. Grapefruit, under the latter condition, would show a market color in 24 hours. In practice, most fruit when placed in the coloring room is partially yellow, and the time in which it can be made to assume the full yellow color is dependent to a considerable extent on the proportion of color on the fruit at the beginning. For rapidity of operation, then, it is important that the coloring room be maintained at temperatures of 80° to 85° F. It is also advisable to pick only fruit showing at least a tinge of yellow. This is particularly true for tangerines, which will not assume in the coloring room the rich, reddish orange typical of the variety, unless they have begun to color on the tree. Very good results were obtained with tangerines showing 15 to 50 per cent of gas at a temperature of 75° to 80° F. with 85 to 90 per cent relative humidity for 60 to 72 hours.

When the weather is cold, as it is at times during the winter, it may be necessary to heat the coloring room in order to have the proper temperature. This can be done with small kerosene heaters or by heating the air in the gas-generating room by removing the plates from some of the burners and using them to heat the gas delivered to the coloring rooms.

Importance of Coloring Quickly

It is obvious that it is desirable to color fruit as rapidly as can be done without injury to its appearance or its dessert or keeping quality. If it is colored in 24 to 36 hours, a much smaller plant can be used than when it is kept in the coloring room from 48 to 72 hours, and the overhead expense will thus be greatly lessened. Another reason for making the coloring process as short as possible is the fact that much of the citrus fruit in Florida is affected with stem-end rot caused either by Diplodia natalensis or Pomopsis citri, which, according to Fulton, Winston and Bowman, will develop at temperatures above 45° or 55° F. If the fruit is colored slowly at temperatures from 60° to 75° there is much more danger of its breaking down from these diseases than if it is colored quickly at higher temperatures, then packed, cooled, and shipped to market and consumed before these rots have an opportunity to develop. It is, of course, evident that some method of quick cooling after the fruit has been colored is advisable with such fruit as has shown a marked tendency to break down from these diseases.

Methods of Regulating Temperatures in Coloring Rooms

The importance of a fairly even temperature in the coloring rooms if fruit is to be colored quickly and evenly was recognized early in this work, and a number of different methods of controlling temperatures were tested.

Insulation of Coloring Rooms

One of the methods of partially overcoming the effect of changes of outside temperatures on the coloring rooms is insulating the room. This insulation need not be expensive, but may consist of paper and sawdust or mill shavings, which are relatively cheap and easily obtained in Florida. Double walls with paper—that

is, boarding on both the outside and inside of the studding with paper next to the studding—has some insulating value, as it provides air spaces in the wall and lowers the heat leakage through it. If these air spaces, 4 to 6 inches in thickness, are filled with dry sawdust or mill shavings, the insulation will be much more efficient, and it will be much easier to keep the coloring room at an even temperature.

Cooling and Humidfying the Coloring Room

At times the temperature in Florida may be too low for rapid coloring, but it is more likely to be too high in the coloring room, so that care not to introduce too much heat with the gas is of foremost importance. One precaution against overheating the coloring rooms, which has already been mentioned, is the placing of the stoves in buildings at some distance from the coloring rooms and forcing the gas through a conduit by means of an exhaust fan. A number of determinations were made on the effect of passing the gas through conduits both above and below ground. It was found also that the air in the coloring room could be cooled by passing the gas over wet cloths or by dropping water into the conduit or into the fan used for forcing the gas into the room. This addition of water also raised the humidity of the gas which was forced into the room. If the water is run into the pipe after it leaves the fan, it will be necessary to have a sufficient head to force it in against the pressure. This need not be over 2 feet, however, as low-pressure fans are used for this purpose. If the water is applied on the suction side of the fan, it is broken up into very small drops in passing through and is readily evaporated. The keeping of a little water in the pipe, so that the warm gas passes over the moist surface, is also of value in cooling the gas and raising the humidity.

It is evident that passing the gas through a galvanized-iron pipe which is exposed to the sun or to temperatures about the same as those in the gas room does not cool the gas appreciably; but if the pipe is long and carried under a building where the temperature is uniformly cooler than that of the gas, some of the heat is conducted away. In cases where the pipe is buried underground, the temperature of the gas is reduced in passing through a long conduit. The main temperature of the ground 2 feet below the surface in Florida during the early fall, when much of the coloring is done, is somewhat lower than the air temperature. Soil also conducts heat more rapidly than air. This explains, then, the fact, as shown in the table, that passing the gas through a buried pipe reduces the temperature more than passing it through a pipe exposed to the air. Cooling the conducting pipe by spraying it on the outside with water is of some value, but does not increase the relative humidity as much as adding water directly to the gas in the fan intake or passing the gas over the water in the pipe. There is no doubt, however, that the gas can be cooled down appreciably by passing it through long conduits either under the ground or in the shade. It is also obvious that by adding water, further cooling can be obtained and the relative humidity increased.

Cooling the gas by refrigeration is another method used to some extent in Florida. One plant is equipped with mechanical refrigeration, passing the gas over direct expansion coils on its way from the generating chamber to the coloring room. Other plants pass the gas over blocks of ice or place ice in the coloring rooms.

With insulated coloring rooms and pipes, these methods of cooling the gas and thereby the atmosphere in the coloring room are undoubtedly effective. There is, of course, the question of cost, which must be considered in this connection, as the maintenance of a mechanically operated refrigerating plant considerably increases the overhead, while a constant supply of ice may not be conveniently available. On the other hand, burying the pipe and adding water are inexpensive, convenient, and give good atmospherical conditions in the coloring room.

Shrinkage of the Fruit During Coloring

When the fruit is received from the tree and held two or three days in a warm room, there is naturally some loss of weight due mainly to the evaporation of water from the fruit. If the humidity of the room is low there is liable to be considerable shrinkage, which may be sufficient to cause it to shrivel or the skin to dry, thus injuring the appearance of the fruit. The data from which these curves were plotted were obtained from fruit colored under commercial conditions in a well-filled coloring room. In the operation of these rooms it is important that the humidity should be maintained high enough to prevent any excessive shrinkage, as this not only decreases the weight of the fruit but makes it less attractive.

Composition of the Fruit as Affected Coloring

It has been stated in earlier publications on this subject that coloring apparently does not affect the composition of the juice appreciably. It is therefore important that only fruit which would pass the solids-acid test of 8 parts of sugar to 1 of acid in the case of oranges or 7 parts of sugar to 1 of acid for grapefruit should be colored. Sometimes there is a change in the ratio during coloring, probably due to the evaporation of water and the concentration of juice, but it is usually slight.

Grading the Colored Fruit

One advantage in coloring fruit is that it can be graded much more easily after it is colored than while it is still green. Defects such as branch rubs and slight scab infections are easily overlooked on fruit partially green color, especially if the blemish is on the green surface. After it is colored these defects stand out against the yellow background. Some types of scale which are very common in Florida are loosened by the coloring process and are more easily removed in the usual operations of washing and brushing the fruit in the packing house. This also improves the grade and makes a more attractive fruit.

Effect of Exposure to Stove Gas on Stem Buttons

As has already been pointed out, the loss or retention of the stem button is dependent to a large extent upon the method followed in coloring the fruit. It was shown early in these experiments that, if Parson Brown oranges or grapefruit were colored at a moderately low temperature of about 70° to 80° F., the buttons could be retained even when the relative humidity was high. The quantity of gas in the room of course has some influence on the formation of the abscission layer at the base of this stem. At the same time a large quantity of gas is usually accompanied by higher temperatures, so that it is difficult to separate these two factors. On the early fruit it was found possible to loosen this button so that it could be removed when the fruit was washed and brushed. By raising the temperature above 80° F. in a number of experiments carried on in various packing houses with this fruit these findings were corroborated, and there seems to be no question but that it is very easy to remove the buttons from the fruit by treating it from 24 to 36 hours at temperatures above

80° F. with a humidity between 80° and 90° F. With the late-season fruit, however, the buttons are not so easily removed, and late Valencia oranges, which turn green in the spring and summer, will retain them in most cases when treated at a temperature of 80° to 85° F. In the experimental work it was found that if the temperature of the room was raised to 90° or 95° F. the formation of the abscission layer at the base of the stem would be accelerated, and that the buttons could be removed from this fruit about as readily as from fruit at the lower temperatures after 24 to 36 hours in the coloring room. It has been shown by Winston and others that stem-end rot, so prevalent in Florida fruit, can be controlled by removing the buttons soon after harvesting. The work of these men has been corroborated by the writers in a number of experiments, and there seems to be no question that this disease can be controlled to a considerable extent by the removal of the buttons. It is therefore advisable in processing or coloring citrus fruit liable to be affected by stem-end rot that efforts be made to loosen the buttons during coloring. Where fruit is not affected by this disease it is of course possible that the packer may wish to keep the buttons on the fruit, which can readily be accomplished by lower temperatures and a slightly lower humidity in the coloring room.

The most convenient location for the coloring rooms is in the packing house or in a building directly connected with it. It is frequently possible to partition off a space near the washer, next to the receiving platform, so that the fruit can be trucked directly into the coloring rooms as it is unloaded and then trucked out to the washer after cooling. This is an economical arrangement in that it eliminates much unnecessary handling or trucking, and fruit can be stored in the coloring rooms during that part of the season when it is not necessary to color with gas.

Another plan, and one which has been followed to some extent in Florida, is to construct the rooms on either side of a corridor, one end of which opens into the packing house, the other on a receiving platform. This plan necessitates somewhat more trucking in handling the fruit in and out of the rooms than the plan just discussed, but is a convenient type of construction where more rooms are needed than can be accommodated in one tier along the end or side of the packing house.

Method of Construction

Whether the coloring rooms are of brick, cement, or frame construction, they should be insulated if an even temperature is to be maintained under the climatic conditions of Florida. This insulation may be simply a 4-inch space made by sheathing and papering both sides of the 2 by 4 studding. A more even temperature can be maintained if this 4-inch space is filled with some cheap insulation, like dry mill shavings, usually readily available in Florida. The rooms should be ceiled, and if practicable the ceiling should be insulated. A high ceiling in the rooms is of no particular advantage, and in some ways it undoubtedly is a disadvantage, as it will be more difficult to keep a constant humidity in such a room than in one with a ceiling not higher than 7 feet. Rooms should be large enough to accommodate at least one carload of fruit conveniently. A room 16 by 20 feet will hold 400 field boxes stacked four high, which is sufficient fruit if of reasonably good grade to make a carload when packed.

As pointed out earlier in this bulletin, the stoves should be placed in a separate building, if possible, both because of danger from fire and to keep the gas delivered to the coloring room cooler. The gas-generating room should be constructed of fireproof materials and have a fireproof roof.

If for some reason it is necessary for the stoves to be in the room with the fruit or in a pit or cellar under the coloring room, they should be placed in a metal box which has a removable lid that is suspended over the stove by a string. If the stove flares up the string is burned and the lid drops down with the edge in a little trough of water. The burning stove is thus inclosed in an airtight metal box, which quickly smothers the fire.

The gas-generating room should be at a distance of 60 feet at least from the coloring rooms or packing house. The conduit for conducting the gas from the generating room to the coloring room may be of galvanized iron and should be at least 6 inches in diameter for a six-car coloring house. If the pipe is buried, tile or iron should be used. The fan for forcing the gas from the generating room to the coloring room should be of the exhaust type, located outside the generating chamber. The intake pipe to the fan should open near the ceiling of the generating room, with a damper so arranged that it will close automatically if the stoves flare up and begin to give off smoke and soot. This can be accomplished by continuing the intake pipe through the roof and cutting in it a V-shaped notch which is about the diameter of the pipe at its widest part and extends almost through the pipe. A sheet-iron damper may then be hinged at the back of the pipe and so arranged that when dropped it closes the intake pipe to the fan and opens the pipe in the roof to allow the smoke to escape and when raised opens the intake pipe and closes the pipe through the roof. This damper is held in place by a small cord which passes over the stoves and is burned through when any of the burners flare up. If the coloring room is tight, the pipe can enter at any convenient place and the opening arranged so that the gas, which at times may be hot, will not blow directly on the fruit.

When a number of burners are used in one generating chamber, a supply tank and float valves are advisable to keep a supply of fuel for the stoves at all times. When only a few burners are employed the ordinary inverted supply tank usually equipped with kerosene stoves may be used.

Coloring Under Canvas Tents

Canvas can be used in the construction of coloring rooms; and, if the entrance is carefully closed and the tent is tight to the ground or floor, the gas will be retained in the room and a fairly high humidity can be maintained. The temperature is, of course, uneven in such a structure, because the canvas has little insulating value and changes in the outside temperature are readily transmitted to the interior of the room. This material also is highly inflammable, making the use of stoves unsafe without placing each in a metal box. Experiments in coloring under canvas were conducted in April, 1923, and it was found that it required a little more time to bring the fruit to full color in tents than in the ordinary double-walled coloring rooms.

Coloring With Ethylene

Considerable work on the constituent of the gas from kerosene stoves, which is the active principle in the coloring of citrus fruits, has been done by Denny, and in one of his papers he points out that fruit can be colored by a number of different gases, some of which are present in the products of the incomplete combustion of kerosene. Denny showed that lemons and oranges could be colored with dilute concentrations of ethylene gas, and he, together with

his associates, worked out a practical method for the application of this gas in a commercial way. The process, as described by Chace and Denny is essentially as follows: Ethylene gas from a cylinder of the compressed thylene, which can be obtained commercially, is released in the coloring room with the fruit in the proportion of 1 cubic foot of ethylene under normal atmosphere pressure to every 5,000 cubic feet of air space. The gas is released twice each day, and ventilating the rooms about an hour before each application of gas is recommended. The temperature of the room should be kept between 70° and 90° F,; 80° is preferable. The same humidity for coloring rooms as is maintained when the gas from oil stoves is used is advised. For oranges in Florida this should be about 85 per cent relative humidity.

Denny devised a tank for use with ethylene which consists of an iron cylinder of convenient size capable of withstanding 500 pounds pressure and equipped with a pressure gauge, so that the quantity of the gas released into it from the cylinder can be measured. It is necessary to calibrate the tank by releasing some of the gas into it, noting the gauge pressure, and then measuring the volume of gas delivered from the tank at ordinary atmospheric pressures. Inasmuch as the gas is inflammable and explosive when mixed with certain concentrations of air, it is important that fire should be kept away from the gas apparatus and out of the coloring room when ethylene is used. If the weather is such that it is necessary to heat the rooms to obtain the proper temperature for coloring, it should be done with steam, hot water, electric heaters without glowing wires, or some such system. In the work in Florida it was found possible to color with ethylene Valencia oranges showing 10 to 20 per cent color in 72 hours, holding the room between 70° and 80° F. with a humidity of 85 per cent. These experiments were carried on in the spring on Valencia oranges which had become green, as this variety frequently does in the late spring. Oranges in this condition are particularly hard to color. The fact that they colored up readily in 72 hours, which is about the time required for this variety with stove gas, indicates that ethylene may be a practical substitute for gas made by a kerosene stove.

Discussion

In a general consideration of the accumulated data on the coloring of citrus fruits either by gases formed by the incomplete combustion of kerosene or by those of similar origin, it is evident that the process presents no particular difficulties from the operation standpoint. It has been shown in numerous instances that this coloring does not appreciably affect the chemical compositon of the pulp or edible portion of the fruit. It is therefore important that only fruit which is palatable and attractive as an article of food should be colored. It is of course well known that a yellow or orange color is not necessarily associated with maturity in citrus fruits, and that many varieties under climatic conditions usually reach their best eating quality when their rind is still green in color.

From the fact that the fruit does not change appreciably in chemical composition during coloring, it is evident that it should have reached such a stage of development that it will pass the test for maturity provided by Food Inspection Decision No. 182 of the United States Department of Agriculture, 1921. In grapefruit "the juice of the mature fruit contains not less than seven (7) parts of soluble solids to each part of acid calculated as citric acid without water of crystallization," and for oranges

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The coloring of fruit which does not meet these requirements may be interpreted as an attempt to conceal inferiority and makes such fruit liable to seizure if shipped in interstate commerce without being specifically labeled. Careful observance of this regulation is very important from a marketing standpoint, as flooding the market with immature fruit may result in a decided reaction on the part of consumers against all citrus fruit from Florida. There is a legitimate field for the application of this coloring process in Florida of fruits which from a combination of varietal characteristics with climatic conditions do not assume the orange or yellow color commonly associated with the ripe orange or grapefruit in the minds of the consuming public, but may remain green in color long after they have reached their best eating quality. If coloring is confined to these cases where it can be legitimately used it will be of considerable benefit in marketing, as it makes the fruit much more attractive and desirable in appearance, and by removing scale, makes it cleaner and easier to grade carefully.

In the experimental work which formed the basis for this bulletin, it was found that grapefruit and oranges could readily be colored by the gas formed by the incomplete combustion of kerosene in oil stoves, by the exhaust from internal combustion engines, or by ethylene. Grapefruit colors more readily than oranges, and the early oranges, such as Parson Brown, seem to assume the characteristic golden-yellow color with less treatment than do the Valencias in the spring. In this work it was found possible to color grapefruit which showed sufficient yellow color through the green to be characterized as 10 to 20 per cent colored in 18 to 36 hours. Oranges beginning to show color required from 48 to 72 hours for the early fruit. It has been shown that during coloring the removal of the buttons, or short ends of stem left on the fruit when it is harvested, very much reduces the decay from stem-end rot and can be accomplished with grapefruit by maintaining a temperature around 90° F. with a high humidity (85 to 90 per cent). If it is desired to retain the buttons the fruit should be colored at a lower temperature, between 70° and 80° F., with a slightly lower humidity, about 85 per cent, which will keep the fruit from appreciable shrinkage and still insure the retention of the buttons. The same holds true for oranges. If it is desired to retain the buttons the fruit should be colored slowly and at a temperature of about 70° to 80° F., if a fruit is known to be liable to stem-end rot and it is desired to remove the buttons it can be accomplished by coloring it at a higher temperature and with a high humidity. At a temperature of 70° to 80° F. and a humidity of 85 per cent, it will require about three days to bring Parson Brown oranges showing some color when placed in the room to nearly full color, whereas at high temperatures the same results can be obtained in a somewhat shorter time. In these recommendations it must be remembered that the time element is not exact, as much depends upon the condition of the fruit when placed in the room.

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TAMPA, FLORIDA

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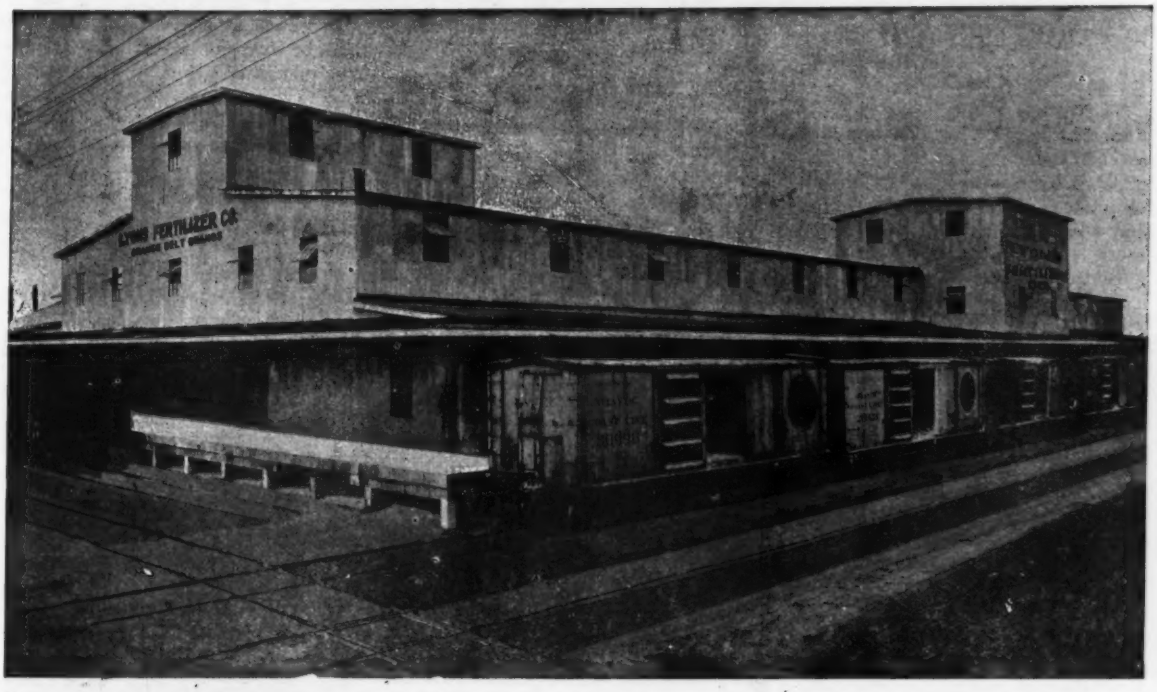


LYONS FERTILIZER CO. ORANGE BELT BRANDS TAMPA, FLORIDA

We are pleased to inform the public that we have completed moving into our new fertilizer plant, which is located at the corner of 4th Avenue and 35th Street; two short blocks south of our old location.

In the construction of this new plant we have installed the latest type of machinery for handling materials in great quantities, and in addition have storage facilities for a very large amount of material. Also, the manufacturing capacity of our new plant is 45,000 tons per annum. This business, of course, had a very small beginning, but the splendid patronage which we have enjoyed has enabled us in a very short space of time to rise to a place among the largest in the fertilizer industry in Florida.

We are at the present time manufacturing, basing and curing our ORANGE BELT BRANDS, so that these goods will be in fine mechanical condition when they reach the grower.

This is a cordial invitation for you to visit our plant upon your first opportunity, and we trust that we may have the pleasure of showing you the actual manufacture and shipping of our ORANGE BELT BRANDS.

We will also appreciate your consideration when figuring on your fall application of fertilizer.

LYONS FERTILIZER COMPANY

Offices, 205 Zack St. TAMPA, FLA. **Phone 2858**

Lyons Fertilizer Co.

NOTES OF THE TRADE

NEW PLANT FOR LYONS FERTILIZER CO.

The Lyons Fertilizer Company of Tampa, Fla., has just celebrated its second year of service to Florida growers by moving into its recently completed plant at Fourth Avenue and Thirty-Fifth Street, directly south of its former location on Seventh Avenue.

The Lyons Fertilizer Company was organized two years ago and took over the fertilizer business of the Exchange Supply Company. The business at that time was decidedly modest, but in the two years since it has come to be recognized as one of the leading fertilizer manufacturing concerns of the state. The business of the company has so expanded that it outgrew its former capacity and the erection of a new plant became imperative to accommodate the growing demands for Lyons products.

The new plant has access to both the Seaboard Air Line and Atlantic Coast Line tracks and a spur track extending along the side of the new building affords accommodation for twenty-eight freight cars. Wide platforms make possible the quick handling of materials, both in loading the finished product and in unloading the raw materials.

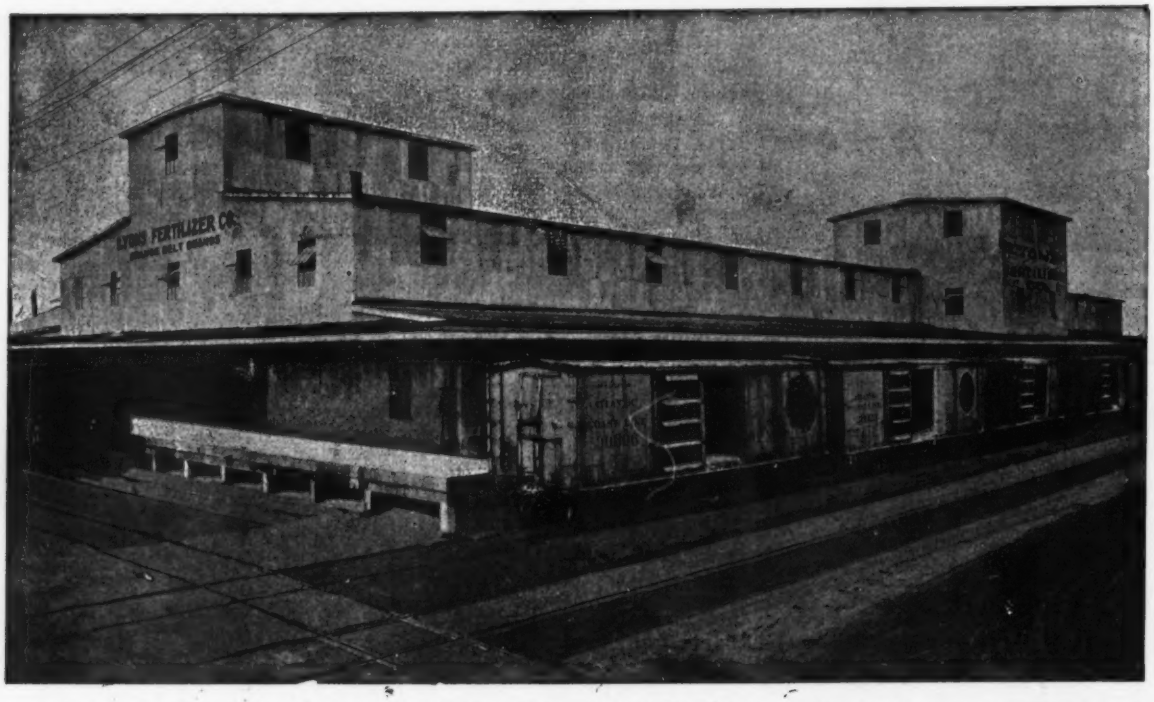
The new building occupies a ground space of 400 by 200 feet, the inside floor space measuring 315 by 120 feet. The average height of the building is 50 feet, the two machinery towers, however, rising to slightly over 60 feet. The capacity of the plant is 45,000 tons of fertilizer per year.

The building was put up by the Austin Co., of Tampa and Cleveland, and is fireproof. The construction is structural steel with poured concrete floors and side-walls reinforced with steel. All of the equipment on the inside of the building, with few exceptions, is entirely of steel.

An inside overhead industrial track of the latest type for the handling of bulk material has been installed and the machinery is of the most modern sort known for the use of fertilizer manufacture. No pains were spared to make the plant one of the most efficient ever built in this state.

Officials of the company report that fully 75 per cent of the material used in the manufacture of fertilizer are imported directly into Tampa. Nitrate of soda is brought in from Chili; Potash from Germany and France; Goat manure from Venezuela; Tankage and Bone meal from Argentine and Europe. Super-phosphate mined in Florida also forms a part of the material used, it was stated.

The company has dealers in practically every city in the citrus belt of Florida and have nine field representatives. While the majority of the fertilizer manufactured is used by citrus growers, the company also makes fertilizer for truck and vegetable soils, lawns, etc. Officials of the company are C. W. Lyons, president and treasurer; I. S. Craft, vice-president; W. L. Waring, Jr., General Manager and secretary; J. D. Wentz, auditor.



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CITRUS COMMENTS

BY

R. E. Lenfest, Manager Horticultural Department
Orange County Citrus Sub-Exchange, Orlando

Young Trees

This month is the time to make the last application of fertilizer on the young trees. Sometimes young trees get slighted during the latter part of the summer because they have not been worked often and regularly enough. The general result is that the trees do not make the growth they should have made. Where this is the case regular cultivation should be resumed at once and continued until the last application of fertilizer is put on and the trees are left to harden up for winter. The fall application of fertilizer should be on and thoroughly worked in by the latter part of the month.

The use of a well balanced fertilizer with part of the ammonia from organic sources is advisable. Of almost equal importance is the amount used and the way it is applied. As a rule the amount given healthy trees each time should be increased slightly over the amount given at the last application. Right in line with this is the fact that the area covered with the fertilizer should be increased each time. Be sure that you know how for out the roots extend and then spread the fertilizer from the edge of the branches out to a point just a little beyond the average extent of the roots. Scratch around the trees till you have actually seen where the roots are and then you will do no guessing.

The analysis should be 5 per cent to 4 per cent ammonia, about 8 per cent phosphoric acid and 3 per cent to 5 per cent potash. Be sure to vary the amounts with the size of the trees and also take into account their color and general growth condition.

Older Trees

The main application of fertilizer on the older trees generally is put on in November. It is alright to have a date set but it is not always best to stick to the same date if by so doing the trees may suffer. Many trees throughout the state were not quite up to the best color and condition in the late spring, some groves are now showing a yellowing of the leaves due to crop strain or perhaps in some cases to excess rainfall. Where this yellowing is present the Fall application of fertilizer should be put on in October instead of waiting till November. If the yellowing seems to be rather marked it might be well to disc the grove while waiting for the fertilizer to be shipped and this will give added help to the trees. And it may also be necessary in increase the amount of fertilizer used.

The above treatment will work well on the earlier varieties but when there are groves or blocks of late fruit a decision must be reached as to which is the most important, the condition of the trees or the crop of fruit they are carrying. If the fruit is to be kept in good shape it will be well to delay the cultivation and fertilizing till later in the fall.

Fall Spraying

Begin to plan ahead for the fall clean up spraying with oil emulsion Get the sprayer in good shape and the hose and nozzle ready to use, then when you want to start there will be none of the delay that is so often talked about in connection with spraying. Use the oil at a strength of at least one per cent of oil in the diluted material. Be sure that the insects are in the right stages to be easily killed and then do very thorough work.

Rust Mites

The rust mites this year have not run according to the regular schedule. They were late in starting in many groves and thus took some growers by surprise. Then the fungus which generally does so much good in controlling them was late in getting its start. In some groves this fungus arrived too late to be of any service and unless dusting was done there will be a good deal of rusty fruit. In numbers of groves inspected in the last few weeks the number of dead mites has increased very rapidly and in some cases making it unnecessary to do any dusting now. But this condition does not exist in all groves and unless someone who is familiar with the habits of the rust mites gives your grove a thorough looking over and tells you that you do not need to spray or dust it will be the safest plan to make an application of some form of sulphur if you are able to find many live rust mites. By so doing you will be taking no chances.

Cover Corp

The cover crop should be cut at this time to prevent damage by pumpkin bugs. This is especially true in tangerine groves although these pests often do rather severe damage to oranges as well. The early cutting of the cover crop reduces the reseeding ability of the cover crop and this fact must not be forgotten. Last year many who had a cover crop of crotalaria did not get much reseeding where the cutting was done early as the first setting of seed pods seemed to have a high percentage of blighted or imperfect seeds. The pods that developed later in the winter seemed to produce a larger amount of good seed. This crop is subject to the attack of the pumpkin bugs and many growers report that the bugs will leave the crotalaria and go in to the fruit and sometimes do a good deal of damage.

Tangerines

Some groves are going to have heavy crops of tangerines and the sizes may be small on these heavily loaded trees. The general practice is to give the tangerine trees an application of nitrate of soda in September to increase the size of the fruit. Where this has been done in the past and the results have been good it will be alright to follow the same plan right on. But where this has not been a regular practice the safest plan is to use a complete fertilizer analizing 4-8-3 and put an amount per tree equal to about one-half the amount of the regular application. Then in November almost the full amount can be used of the regular fall fertilizer.

Following such a plan has given good results and is much less liable to cause trouble such as dieback or other unhealthy growth the next year.

FERTILIZING FOR GROWTH AND FRUIT PRODUCTION

Continued from page 6

content of the soil the better the quality of fruit produced. Unless your grove is located on very rich soil you cannot afford to let a year go by without plowing or disking in some green crop to build and keep up this content. Our hot sun burns up the humus in the soil much more rapidly than farther north.

At the Cocoa meeting of the Horticultural Society, I advanced the theory that in order to produce oranges with true orange color you had to have plenty of humus in your soil, and that the depth of color depended in a large measure on your humus content. At present this is but a theory, but I hope some day to be able to prove that it is more than a theory.

Some growers still believe that plowing under or discing in green manure will bring on dieback. Green manure plowed under will not give you dieback if you make allowance for the plant food that you add when you plow under or disc in your green manure crop. If you have a legumnous cover crop you can often safely cut down the ammonia in your fertilizer by one percent in your fall application. Your tree itself is your best indicator as to how much ammonia you can cut out. Every grower soon learns from the appearance of his trees how much they are in need of fertilizer.

RED-SQUILL POWDER FOUND SAFE FOR POISONING RATS

Rat Poison

According to results of experiments with red-squill, conducted jointly by the bureaus of biological survey and chemistry of he United States department of agriculture, a powder can be made from dried red-squill bulbs which will have an efficient and uniform toxicity for rats and at the same time apparently not unduly endanger human beings or domestic animals.

The use of powdered red-squill for the destruction of rats is comparatively recent in this country, although the poison has been in limited use in Europe for centuries. It has never come into popular use, however, even there, because of its tendency to vary greatly in potency. Several of the factors influencing its toxicity have been developed during the course of the present investigation. Officials of the department of agriculture anticipate that these experiments will be of material assistance in the production of a uniform and stable squill product. This poison should greatly benefit poultrymen and farmers generally who hesitate to use some of the commercial rat poisons on account of the attending danger to livestock.

SEVEN FARM ADVANTAGES

Here are seven farm advantages set forth by Clarence Poe, editor of The Progressive Farmer.

1. Farming is free from extremes of poverty or wealth.
2. Farming is an independent life.
3. Farming offers an opportunity for creative work.
4. Farming is a many-sided occupation in which may be exercised every faculty of body, mind, and spirit.
5. Farm life is not only most wholesome physically and wholesome mentally, but wholesome morally.
6. The "ownership of land is a patent of nobility."
7. On the farm there is an opportunity not only "to make a little nook of God's creation a little better, richer, fairer, and more worthy of God," while one lives, but to bequeath from generation to generation a homestead embodying the results of one's own life and labor.

"Why do Ideal Fertilizers produce Better Fruit?"

is a question that is sometimes asked by a newcomer to Florida. IDEAL FERTILIZERS are made from materials best suited to the proper growth and development of Florida crops.

The materials used are correctly proportioned so as to give a well balanced and steady supply of **available plant food.**

Our modern factory insures the materials being properly combined—not simply mixed.

IDEAL FERTILIZERS are the result of over thirty years practical and scientific experiment.

Let us supply your needs for the fall application.

WILSON & TOOMER FERTILIZER CO.

Manufacturers of Ideal Fertilizers

Jacksonville, Fla.

Beautification of County and State Highways

By Clarence A. Bass, Assistant Nursery Inspector, State Plant Board

There has been considerable discussion but very little accomplished in regard to the beautification of the State and County highways. Florida is building and bringing to completion several important State highways and all of the counties are building roads from time to time that are going to be permanent. What more fitting climax to this development of these important avenues of travel could be desired than their beautification by attractive plantings of suitable trees and shrubs?

The beautification of the completed highways could be achieved at a reasonable cost and would be worth thousands of dollars to the State in a very short time. The planting of well selected trees and shrubs along the highways of our State would not only provide its people with comfort and something of esthetic value but would save the State many thousands of dollars on the maintenance of its highways because roads last longer where shaded than where fully exposed to the sun.

In the writer's opinion the State Road Department or each individual county could do this beautification work cheaper than any club or organization because, to perform this work efficiently, it would be necessary for the work to be brought under one head. It is suggested that each county employ some good man who is competent to grow plants and set them out on the highways and hold him personally responsible for the highway beautification work. This work should preferably come under the supervision of the county engineer, since the man employed to do this beautification should work under his direction so he would not conflict with the engineer's road plans.

It is going to require a considerable outlay of capital to do this work effectively and the state and counties are better able to finance such a project than any club or organization and could do a better and more systematic job. Aside from the financial consideration, if various clubs and organizations attempt this work they will probably adopt dissimilar planting plans so that the roadside plantings will never look so good as if they had been made with more uniformity. Clubs and other organizations, however, can do a great deal to promote state highway beautification by using their influence to get the state and counties to take over this project and finance it.

A good piece of land should be selected somewhere in each county that would be suitable for a nursery and each county could grow the majority of the plants that they would use. If this is not feasible they could contract with nurserymen to grow them at a fixed price.

After the highways have been planted the task of beautification is by no means finished because the plants will still need attention in the way of watering, cultivation and fertilization. If we just set out plants and give them no care afterwards we will not realize our ideal in the beautification work either very quickly or very effectively.

A great array of shade trees and shrubs are available for planting but discretion must be used not to plant tropical or subtropical trees too far north on account of their susceptibility to injury by cold. Of the trees more commonly planted in central and southern Florida, the following are particularly recommended: Australian silk oak, hardy Australian pine, cypress pine, live oak, cabbage palmetto, Cocus plumosus, Washingtonia palm, and Canary Island date palm. The coconut, fishtail and royal palms are magnificent subjects but should not be planted outside of the protected coast country from Fort Pierce on the East Coast to St. Petersburg on the West Coast. The cocoanut palm does not do as well inland as along the coast.

Virtually all the palms are subject to insects and diseases, so that good care and attention should be given them. However, where they can be grown successfully, they are well worth the effort by virtue of their great beauty and the tropical effect they create.

Of the shrubs suitable for planting in between the trees the following are particularly recommended for central and southern Florida; Acalypha, Allamanda, Crotons, Hibiscus, Ixora, Cryptostegia, Malaviviscus and Oleander.

Although the plantings in North and West Florida are limited to subjects not especially susceptible to cold, there is still a great wealth of material to select from. Among the

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Citrus Special 2-10-10	2	10	10
Fruit & Vine 5 Per Cent Special	3	5	6
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Gem Orange Tree	4	6	5
Gem Tangerine	5½	12½	7½
Satsuma Special	4	6	5

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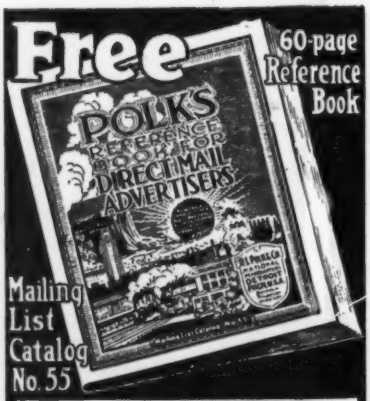

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most desirable trees may be mentioned laurel oak, live oak, cherry laurel, elm, magnolia, sweet gum, cabbage palmetto, California fan palm, and Canary Island date palm. Among the most desirable shrubs may be mentioned Abelia, Althea, cape jasmine, crape myrtle, japonica, and plumbago.

The beautification of our highways by attractive plantings unquestionably would be a good investment. It would be a striking advertisement for the counties that had their highways beautified and would afford the people great pleasure and enjoyment as they ride along them.

BUDDING, GRAFTING AND TOP-WORKING

Continued from page 8

fourths inch apart, remove the bark and prune back the top of the tree severely. This will force out the bud and avoid a severe shock to the tree. As the bud grows it should be tied to the branch. When the buds are a foot or so high the top of the tree can be removed leaving about a foot above the buds. After the buds have grown sufficiently and are well united to the branch this supporting limb should be cut off close to the bud and painted with white lead or melted paraffin.

Top Working of Old Trees

The common practice is to head back the tree at one time, this should be done about February or after the danger of freezing weather. Allow all the young shoots to grow but pinch back all except the shoots that are needed for budding. After the trees are budded and a good new top is formed the surplus shoots can gradually be removed. Care should be taken to make clean cuts and the larger ones painted.

The importance of selecting trees of known quality and productiveness cannot be overly emphasized. And then the grading of the fruit for juice content, form and seeds are of primary importance for the stock trees. The seedlings should be selected with great care and by the careful selection of budwood the best results should be obtained.

LIME ROCK OUTPUT INCREASES

Limestone production for Florida during 1925 amounted to 3,795,420 tons with a valuation of $4,348,234, as compared with 2,873,360 tons with a valuation of $2,943,778 in 1924.

This represents an increase of 922,066 tons and $1,404,456, according to the figures announced by the state geologist in co-operation with the United States Bureau of Mines.

Better Fruit-

can be produced only through proper care of the grove and the part that commercial fertilizers has played in the cultivation and development of citrus fruits is no longer a subject of conjecture, but one of assured facts.

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A reputation for highest quality stock and fair dealing over a long period of years.

One of the oldest nurseries in the state.

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Leesburg, Florida

ATLANTIC COAST LINE REPORTS GOOD BUSINESS

"Revenues of Atlantic Coast Line continue to show an improvement. June freight car movement was about 10 per cent ahead of last year," said J. R. Kenly, president. "Large movement of road and building material is being maintained, with Florida probably leading the other southern states in this respect, there being no slackening in its road building program. Our passenger traffic both north and south bound is also holding up well.

"Net operating income for June, July and August, however, is expected to show little change from 1925 figures, due to Coast Line's heavier maintenance expenditures in advance of peak traffic later in year.

"Despite fruit crop and adverse weather which reduced truck farming production about 15 per cent, farmers received good prices and are afoot for a larger production in a healthy financial position. Plans 1927 from 1926 season. Recent rains helped cotton and tobacco crops materially in our territory. The textile industry is experiencing a slight recession, but coal and iron movement continues heavier.

"There is no need for worrying about the South. Its natural resourcefulness and steady expansion assure continued prosperity." Mr. Kenly added.

CITRUS SHIPMENTS IN LAST SEASON AMOUNT TO 14,647,810 BOXES

A total of 14,647,810 boxes of citrus fruit was shipped out of Florida in the 1925-26 season, including the amount taken by canning factories and transported to Georgia and Alabama by trucks. The compilation was made by Robert Taylor fruit and vegetable agent for the Atlantic Coast Line railroad, with headquarters in Orlando.

Rail lines handled 13,729,704 boxes, water lines 181,583 boxes, and trucks carried 300,000 boxes to the two neighboring states. Canning factories took 436,523 boxes.

The total for the season is decidedly lower than that for the season of 1924-1925, when approximately 19,200,000 boxes were shipped. Part of the decline is attributed to real estate development activities which removed many bearing groves from the productive list. Some of it also is due to an unprecedented number of visitors to Florida, with a consequently increased local consumption.

THE CULTIVATION OF CITRUS FRUITS

By H. HAROLD HUME
Illustrated

The author of this manual is recognized throughout Florida and the Gulf Coast as an authority on citrus fruits, but his book is not confined to this region. Mr. Hume has been a teacher and investigator in the University of Florida, and is now a citrus-grower and nurseryman of large experience. This new book is founded on the author's "Citrus Fruits and Their Culture," long a standard treatment in its many editions. The present work, which is abundantly illustrated, considers the whole subject of the culture of oranges, kumquats, grapefruit, lemons and others, as varieties; land and location, propagating, planting, tilling, fertilizing, pruning, spraying, harvesting, shipping, and marketing. The author also discusses the botany of the group, history, breeding, insects, diseases, and related questions. This book promises to become the standard treatise for its field. Price $5.00.

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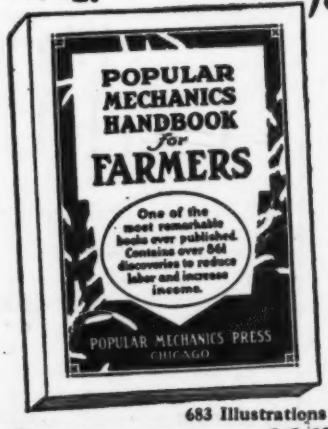
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683 Illustrations

Here's "the most remarkable book ever published for farmers," says one authority. It is remarkable in the extreme practical nature of its contents, in the wide range of farm subjects covered, in the world of illustrations it contains, and in the extremely low price.

861 Discoveries

One discovery sometimes makes a fortune. Here are 861 of them, any one of which may be of many dollars value to you. These discoveries may be classified as follows:

138 for the farm shop
35 on fencing
98 on auto, truck, and tractor
41 on farm buildings
36 on field machines
48 on concrete work
22 on orchard work
23 on painting
15 on live stock
25 on electrical work
7 on greenhouse work
32 on farm tools
34 on garden work
24 on poultry
17 on the lawn
149 on household helps
70 on miscellaneous farm work
16 on hunting, fishing, and trapping

—and every plan has been tested and found to be a money-saver. Most of the articles are illustrated with photographs or drawings. The devices described are easy to make because of these pictures and clear descriptions.

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How you could forge ahead of other farmers in a way that would insure you liberal and steady profits! This book enables you to do the next best thing—you may have the experiences of 417 lives—experiences of successful farmers as told by themselves—briefly, clearly, completely. And many of these experiences are illustrated with accurate drawings! Imagine 670 pages chock full of ideas—683 crystal clear illustrations. Just think of the value to you!

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THE CITRUS INDUSTRY
TAMPA, FLORIDA

1925 Agricultural Yearbook Now Being Distributed

The 1925 Yearbook of the Department of Agriculture, which is the fifth and last of a series inaugurated under the direction of the late Henry C. Wallace, is now being distributed. The preceding volumes of this series, which deals primarily with the economic aspects of agriculture, have covered in a comprehensive manner the subjects of livestock, grains, dairy products, tobacco, forestry, forage resources, fibers, land utilization and land tenure, highways, credit, taxation, the poultry industry, and the weather forecasting.

The present volume discusses the fruit and vegetable industry, contains the Secretary's annual report to the President, and more than half of its 1500 pages are given over to agricultural statistics.

"In the five years covered by the series of Yearbooks now concluded," said Secretary Jardine in announcing the 1925 volume, "American agriculture has been harassed as never before. Farmers have been handicapped by disparities between the prices of things they have had to sell and the things they have had to buy. They have been faced with urgent crop readjustment problems and with a decrease occasioned by overstocked and demoralized markets. The economic studies contained in this series of Yearbooks were expressly intended to assist farmers in coping with such problems and difficulties. There is reason to believe that they have accomplished this object. Although the present volume deals with a branch of agriculture that has been less affected than some other branches by the postwar depression, the fruit and vegetable industry is not without present economic problems. I hope this Yearbook may help it to deal with such problems effectively."

The articles on fruits and vegetables in this volume include historical material relating to fruit and vegetable growing in this country. The present status of the industry is discussed as well as its marketing problems, cultural methods and the economic factors that determine its development. Considerable space is devoted to plant pests and diseases and to methods of combating them. Recent progress in drying, canning and pickling is recorded and attention is given to the problem of utilizing surpluses and by-products of fruits and vegetables.

The value of the 1925 book is not limited to the fruit and vegetable interests. In the 772 pages of statistics may be found the answer to numerous questions arising in the minds of various agricultural interests.

The agricultural Yearbook is published under a special Congressional appropriation. The distribution of the 400,000 copies published will be made largely by Congressmen and Senators, each of whom is allotted about 400 copies. The 20,000 copies purchased by the Department of Agriculture will be allotted to the various bureaus in the department for distribution to their field representatives and cooperators. Persons who are not on the list of some bureau or for any reason can not secure a copy from a representative in Congress, can purchase the Yearbook from the Superintendent of Public Documents, Government Printing Office, Washington, D. C.

Fair time is coming. Wide-awake farmers will make plans now for exhibiting their best products.

Keep farm implements and machinery not in use under shelter.

Striking the most profitable balance

THE big question which Florida citrus growers are asking today is not "Shall I fertilize?" but "How much can I use to strike the most profitable balance?"

Your profits depend upon the quality and yield of your fruit—and the fruit reflects the fertilizer.

Now is the time to make preparation for your fall fertilizing so that your trees may go through the winter months in the best possible condition.

Naturally the methods you follow will depend to some extent on your local conditions. It will pay you, however, to keep in mind the following facts:

A good supply of potash in your fertilizer is of great importance. It will help to give a thinner rind on your fruit and lessen the amount of rag. It has a marked benefit on the keeping and carrying qualities of citrus fruits and plays a very important part in maturing new growth and hardening the wood. Trees well supplied with potash are better able to resist serious damage from cold and insect attacks.

Experience has shown that for best results fall fertilizers for citrus trees should contain *less* ammonia and *more* potash than the spring fertilizers.

For trees producing 10 boxes of fruit, a sound and approved method is to apply during the year from 30 to 50 lbs. of fertilizer per tree. This same proportion may be kept for each additional 10 boxes of fruit. A well-balanced fall fertilizer for bearing trees will generally contain about 3% ammonia, 8% phosphoric acid and 8% to 10% potash. Applied in the right amount this should help you to strike a profitable balance.

Potash Importing Corporation, of America, 10 Bridge Street, New York.

Potash gives best results when used in connection with a sound soil fertility plan. It is our purpose to discuss it from this viewpoint in accord with the fertility programs of the various agricultural extension forces.

Genuine German POTASH

Will Enforce Inspection Law

State officials are taking steps to vigorously enforce the green fruit inspection law and to prevent the shipment from the state of any green or unfit fruit—fruit which fails to pass the required tests. A large force of inspectors and assistants are now preparing to actively enter the field with the opening of the shipping season.

Haines City is a veritable hive of industry so far as the citrus industry in concerned, since J. Hinton Pledger, supervising inspector, and his force of assistants have established headquarters there. A branch of the state laboratory has been set up and is in operation manufacturing the solutions necessary for use in making maturity tests to comply with the citrus fruit law, now in the second year of its enforcement.

As the season gets under way and packing houses begin active operations, a force of some 200 special citrus inspectors will be in the field in addition to the regular state inspectors of the inspection division, under the leadership of Mr. Pledger, who has been in charge of the division since its creation by the legislature in 1925.

Had Wide Experience

Mr. Pledger, who has a record of 15 years of continuous service as chief clerk of the pure food division of the department of agriculture, was made supervising inspector of the consolidated food, drugs, feeds, fertilizers, gasoline and oils, gasoline pumps and citrus fruits. Through his efforts the inspection work of the state has been organized on an efficient basis resulting in the saving of thousands of dollars annually and insuring standards of purity and weight.

Ellis Woodworth, of Tampa, one of the oldest inspectors in the state, has been made inspector in charge of Hillsborough county, and will have charge of the inspection work in this county. He states that under instructions from the chief, the law will be positively and literally enforced.

The attention of wholesale and retail dealers in citrus fruits is called to the following points in the citrus fruit law:

All packers, shippers, wholesalers, jobbers, brokers and dealers in citrus fruit, when selling oranges or grapefruit to retailers or consumers between Sept. 1 and Nov. 26 of each year, shall furnish them with a certified statement to the effect that such fruit is mature; stating also the number and date of the maturity certificate issued by a duly authorized inspector of the department of agriculture, and must in addition affix to such certified statement a sufficient number of cencelled inspection stamps to cover the tax on the number of boxes or crates of oranges or grapefruit sold to retailers or consumers.

To Seize and Destroy

Inspectors of the department are authorized and directed to seize and cause to be destroyed all oranges and grapefruit being illegally offered for sale by retail dealers, when such dealers cannot establish the fact that such fruit is mature and that the inspection tax provided by law has been paid thereon.

Each box or crate of citrus fruit shipped or transported by express, boat, motor vehicle or other private conveyance shall have affixed thereto the inspection stamp as evidence of the maturity of such fruit and the payment of the inspection tax provided by law.

Any citrus fruit, while in transit or at destination, which fails to bear the inspection stamp shall be seized and destroyed.

Any person obstructing or resisting a duly authorized inspector in the performance of his duty is subject to fine or imprisonment.

Violation of any of the provisions of the citrus fruit law shall be punished by a fine of $50 to $1,000, or by imprisonment for one to 12 months; or by both such fine and imprisonment.

Inspectors are not permitted to make tests at any place except duly registered packing houses.

ROYAL PALM NURSERIES EXPANDING FACILITIES

The Reasoner Royal Palm Nurseries at Oneco are soon to undergo the largest improvement and extension program in the 42 years of their existence. It has been announced by the management. The improvements in the nature of new houses and better growing facilities will have an estimated cost of $15,000, and will double the commercial capacity of the plant.

RUST MITES

Now present in many groves. Are you prepared to take prompt Control Measures for the protection of your fruit? This insect multiplies and spreads with great rapidity and the damage is quickly done.

SCHNARRS NO. 1 SUPERFINE DUSTING SULPHUR

An effective and economical remedy. Or, if you prefer spraying—

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will give results. If scale is to be considered in addition to Rust Mites

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Manufacturers of

Florida's Standard Oldest Line of Sprays

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FACTORS INFLUENCING CITRUS APHIS OUTBREAKS

Continued from page 11

yours begins to harden, it will be his hard luck. Take extra pains to see to it that your grove is not one of the last in the community to put out new growth in the spring.

If the spring flush of growth is allowed to mature normally the trees will naturally go somewhat dormant again in the late spring, late April or May, and this is very hard on the aphids. But if you allow the aphids to attack the first flush of growth in the spring so that trees do not put out their normal flush, they will be attempting to put out new foliage in the late spring when they should go dormant and this will afford "permanent pasture" to keep the aphids going thruout the entire spring.

By following the above cultural practices, it will, I am convinced, be possible for the growers to get their spring growth out with very much less damage than was suffered last season, even if the coming winter be mild.

The aphids have never done much damage to the June flush of growth. They are not usually numerous at that time of the year. We have discovered that there are three factors which tend to reduce their numbers during the summer. Mr. Tissot, who is working on their life history finds that they grow more slowly and reproduce more slowly as the weather gets hot in June. Miller and Thompson have observed that heavy rains, which are common during the rainy season, are very destructive to the aphids in that they are washed off the trees and dashed to death on the ground. It was observed very early in our work with aphids that a prolonged hot, humid season was very apt to start a fungus disease due to a species of **Empusa** which was very effective in cleaning up aphids infestations. With these three factors working against them it does not seem probably that aphids will ever be very severe on the summer flush of growth.

One point about setting out a new orchard. We have observed both the past spring and the previous one that young trees set out in December are practically immune from aphid attacks when the growth puts out the following spring. These first sprouts which put out from early transplanted trees are seemingly not succulent enough for the aphids. They, perhaps, are relatively hard and dry like half mature foliage of old trees. However, trees set out late in the season, March or April, are often very severely damaged by aphids. It is very important that the first flush of growth put out by the young trees should be allowed to mature normally, as the young defoliated trees need all the young leaves they can possibly put out. It will be much more economical to set out these trees in December and escape injury than to put them out in March and April and to fight aphids on them.

Send the children to school on the first day. A physical examination by the family doctor will help to get the children in good health before they start to school.

To remove iodine stains, soak them in alcohol.

THE big yields and high quality of the crops grown with *Armour's* BIG CROP brands reflect the true crop-making ability of these fertilizers. They are made to fit Florida crops and soils. Each formula is the result of our more than 30 years experience in Florida. Our BIG CROP trade-mark on every bag and tag is your guarantee of highest quality.

Among our four types of BIG CROP citrus mixtures there is one especially suited to the Fall needs of your grove. And there's a BIG CROP vegetable fertilizer to satisfy every need of your crop and soil. Descriptive booklets and price list free on request.

Our practical experienced field men will be glad to help you solve your fertilizing problems. This service obligates you in no way.

Armour
FERTILIZER WORKS
JACKSONVILLE FLORIDA

CANNING OFF-GRADE FRUIT

The Florida Citrus Exchange has completed contracts which will provide a profitable market for all low grade, off size, off color citrus fruit during the coming season. The completion of these contracts is just another step in the perfection of the marketing efficiency of this organization.

This type of fruit is highly edible and is sound on the interior. Lack of constant size, shape and color make it extremely difficult to market. It is fruit which no agency can afford to put on the regular markets of the country. Yet it is fruit which represents some investment on the part of the grower and should show a profit.

The contracts have been made with canning plants operating in Florida and Georgia. In addition to these, a prominent operator of several Porto Rican canning factories has been in touch with the Exchange paving the way to open up several plants in Florida. The steady and encouraging rise in the importance of these canneries throughout the state indicates that in future seasons all of this fruit will be kept out of the box fruit market. Not only does this provide increased profits on fruit, but it clears the box market of all undesirable fruit, thus bringing better prices.

HEAVY INFESTATION OF RUST MITES ON CITRUS SHOULD BE CONTROLLED

Gainesville, Fla.—According to J. R. Watson, entomologist of the Experiment Station, there is an unusually heavy infestation of rust mites in the groves now, and he advises growers to take control measures. Mr. Watson states that a heavy infestation at this time of year is a little unusual, but exists, nevertheless.

This heavy infestation of rust is likely to cause a large percentage of russet fruits and result in other damage if control measures are not taken promptly. Sulphur in some form is recommended as a control.

For grazing purposes it has been proved by actual demonstration over and over again that unburned pasture land produces from two to six times more feed in a single season than burned-over lands do. The longer the fires are kept off, the better the grazing. This should be and can be proved in your county.—Pine Inst. of America.

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Write Today.
OCKLAWAHA NURSERIES INC.
"Pedigreed Citrus Trees"
Lake Jem, Florida

FOR SALE CHEAP—Eleven acres high, rolly citrus land; 4 acres cleared with small house, and large nice bearing orange trees full of fruit. Nicely located near Altamonte Springs, Fla. For particulars write H. A. Lunquire, 41 N. W. 29th St., Miami, Fla.

WANT TO SELL HALF INTEREST IN FIFTEEN ACRE SATSUMA BEARING GROVE ON HIGHWAY NEAR PANAMA CITY, ROBT. LAMBERT, OWNER. FOUNTAIN, FLA.

SATSUMA BUDWOOD from Bearing Trees. Hills Fruit Farm, Panama City, Fla.

FOR SALE—Pineapple land in winterless Florida. $15 an acre. Almont Ake. Venus, Fla.

MISCELLANEOUS

ADVERTISING RESEARCH WANTED: Specialist in foods and nutrition, drugs, disinfectants, and insect control. Successful record in copy work and syndicate writing. Desire assignments in fruit products. Can introduce new facts and put new punch into educational advertising. Mrs Susa P. Moore, P. O. Box 523, Chicago.

FOR SALE—Dairy and stable manure, car lots. Link & Bagley, Box 464, Tampa, Fla.

WHITE WYANDOTT Cockrels, regal strain—the best in the country, direct from Martin pens. Utility and show birds $5.00 each; also eggs for hatching $5.00 per 15. W. A. King, Gen. Del., St. Petersburg, Fla.

REPOSSESSED player piano may be purchased for small unpaid balance by reliable parties on easy payments. We guarantee this player to be in excellent condition and a very unusual buy. Plenty of good rolls and bench included. M. L. Price Music Co., Tampa & Zack St., Tampa.

SOUTHDOWN SHEEP, White Rocks, Toulouse Geese, Guineas, Angora and Milk Goats, Circular free. Woodburn, Clifton, Va.

WANTED: Competent man to work ten acre farm near Ocala, Florida, profit sharing basis. Young tangerine grove, many fruit trees, rich soil. Big money in onions, poultry. Comfortable, furnished house, good barn. R. F. D. 41, Burbank, Fla.

FOR SALE—Remington Portable Typewriter with standard keyboard. Has all advantages of larger machine. Ideal for farm and home use. $60 cash or sold on easy terms. Remington Typewriter Co., 103 Parker St., Tampa, Fla.

FARM—GROVE—HOME

22 ACRE large bearing grove; modern two-story, 8 room house, completely furnished on third largest lake in state in thriving town; good roads, church, schools; complete line farm implements and tools. P. F. Cloonan, Yalaha, Lake County, Fla.

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LAREDO SOY BEANS, considered free from nematode, excellent for hay and soil improvement. Write the Baldwin County Seed Growers Association, Loxley, Alabama, for prices.

MILLION Porto Rico Potato Plants, $2.50 1000. W. W. Williams, Quitman, Ga.

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12,000 QUALITY White Leghorn and Ancona Chicks, July delivery, reduced to $10.00 per hundred, postpaid, prompt shipments. We are only few miles Florida line. Fain's Hatchery, Edison, Ga.

FOR SALE—All varieties bananas and citrus trees. D. A. Nipels, Palm Harbor, Fla.

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